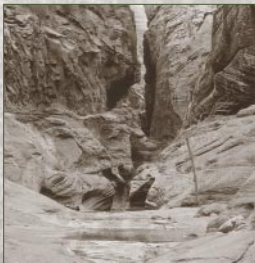


Natural Resource Year in Review

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*A report of the National Park Service,
summarizing and analyzing the year in natural resource
stewardship in the national park system*



**Water rights preserved
at Zion.** See page 7.



**Flood experiment builds beaches
at Grand Canyon.** See page 34.



**President Clinton shields Yellow-
stone from mining.** See page 39.



**Mojave National Preserve
takes on threats.** See page 41.



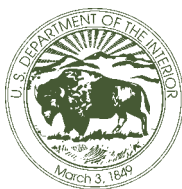
**Insects control thistles
at Wind Cave.** See page 51.



**Kemp's Ridley sea turtles return
to Padre Island.** See page 55.



*In memory of John Christiano,
whose contributions to the
Air Resources Division over
the past 17 years helped lead
the way to increased protection
and preservation of air quality
and visibility within the
national park system.*



Natural Resource Year in Review | 1996

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D-1182 May 1997

**Saguaro National Park,
Arizona** (right).

(Cover) **Grand Teton National
Park, Wyoming.**



Printed on recycled paper.



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FOREWORD

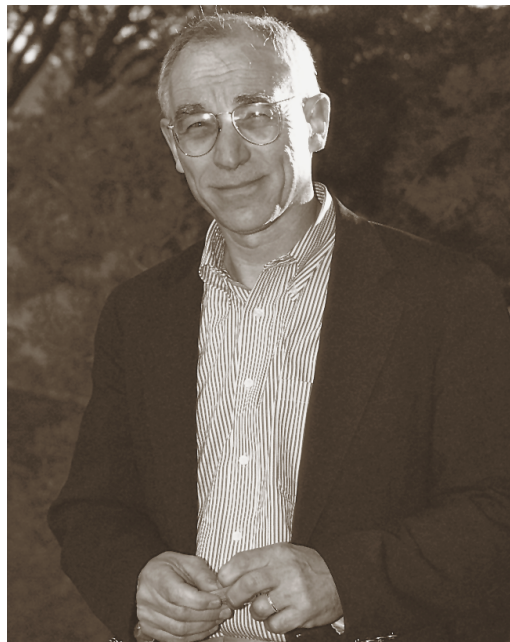
As the 21st century approaches, the natural resources of our national parks face increasing uncertainties. As our nation's population and economy grow, national parks are subject to greater internal and external pressures—and potential impacts. As the American public grows more engaged in national parks, natural resource management must keep pace with our success in accommodating visitors.

To understand and counter the effects of an increasingly human-dominated landscape and high levels of visitor use, we must provide national parks with a science effort consonant with long-term preservation. Bringing adequate science to bear on the complicated task of resource preservation must be a top priority for the National Park Service. Our science effort (both the procurement of new information and its application) must be of sufficient sophistication, professionalism, and magnitude to match our task—preserving 83 million acres of America's richest natural systems. To reach this goal will require a thorough reassessment of the scope of our task and the current level of effort.

Are time and opportunity slipping away from us? Perhaps we can best answer this by keeping better logs of where we have been. This report is our first attempt to take stock of the natural resource events in national parks in the preceding calendar year. Herein you will find annual achievements, science highlights, and perhaps ample testimony to the complexity of managing national parks in modern landscapes.

We hope this annual log will be enjoyable and informative to those concerned with the state of the natural resources in our national parks, and our ability to achieve the task of preserving our national parks for the enjoyment of future generations.

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T H R E A T S

Natural resources in national parks are imperiled by a myriad of threats originating from inside and outside park boundaries. From habitat destruction to air and water pollution, threats are diverse and on the rise. Census projections suggest that pressures on natural resources in parks will increase in the next century, making preservation even harder. The ability of the National Park Service to deal effectively with the wide variety of threats is small in comparison with the needs and represents a dangerous trend for the future. Monitoring of resource conditions is helping and supplies information on the state of park natural resources. This and other scientific information provides the basis for the National Park Service to plan and carry out rational resource management approaches to address even some of the most vexing preservation problems. Meanwhile, threats continue their march.

Threats and information

by Jeff Selleck

Threats to natural resources in national parks are as varied as the parks themselves. Real estate development on the boundaries of Saguaro National Park puts human activities right at the park's edge. Visitors trample alpine meadows in Mount Rainier National Park as they fail to heed regulations and informational signs explaining the fragility of tundra vegetation. Air pollution from distant sources wafts across park boundaries reducing visibility and introducing pollution in park ecosystems across the country. Traffic, mining, logging, hazardous materials, grazing, exotic species; the list of threats goes on and on. And because of each threat, natural resources in the national park system are deteriorating. One weapon against these threats is information about them and on the condition of park natural resources.

In a General Accounting Office (GAO) report issued last August (*National Park Service: Activities Within Park Borders Have Caused Damage to Resources* [GAO/RCED-96-202; August 1996]), eight parks surveyed identified a total of 127 internal threats that directly affect park

resources. Most fell into five categories: the impact of private inholdings or commercial development within parks, the impact of nonnative wildlife or plants on native species, the damage caused by illegal activities such as poaching, the routine wear and tear caused by visitation, and the unintended effects of park or agency actions. The majority of these threats have worsened over the past decade and 80% have already caused more than minor damage to park resources.

In a 1994 report (*National Park Service: Activities Outside Park Borders Have Caused Damage to Resources and Will Likely Cause More* [GAO/RCED-94-59; January 1994]), GAO relayed that park managers responsible for 317 units of the national park system identified 632 external threats to park resources. These can be classified in four main areas: urban encroachment, water-quantity and quality issues, air pollution, and human activities. A few of the lost values associated with the threats include diminished scenic views, polluted streams, habitat destruction, and a loss of biodiversity. In many cases the sources of specific threats have not been identified, but many parks have taken initial steps, such as establishing community outreach programs, to address some of the concerns.

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Hazardous threat (left)
Illegal hazardous waste dump site,
Mojave National Preserve, California.



© Karen Boucher Seibert

Air, water, and noise pollution are natural resource threats posed by cruise ships that visit Glacier Bay National Park and Preserve in Alaska. Additional concerns are the number of ships visiting the park and possible interference with whale migrations.

Whether they originate inside or outside a park, natural resource threats are diverse and complex and no comprehensive inventory of them has been completed since 1980. While a list of threats is not particularly useful in and of itself, when combined with scientific information on the severity of impacts caused by various threats, the information is very important for resource preservation.

Data on some threats and the condition of park resources are being gathered through the national Inventory and Monitoring Program and other national park programs. This information is key to the process of planning resource management activities to prevent or mitigate threats, and must be gathered more extensively in the coming years. The National Park Service is making progress in this area, and would like to do more.



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Theft of petrified wood is a perennial problem at Petrified Forest National Park, Arizona.

Demographics and resource preservation

by Glen Kaye

"The world's most important arithmetic is the arithmetic of the exponential function."

— Albert A. Bartlett, *Carrying Capacity Network*

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The paradox is disturbing. Although ecologists recognize population dynamics as a core process of ecosystems, land managers and policy makers often fail to associate increases in human numbers with the health of parks. This thinking persists because the consequences of compound growth are so subtle, accumulating day by day by unnoticeable day. Moreover, many view America's population as unchanging. But America's population will continue to grow during the 21st century, and bring unprecedented pressures to U.S. parks and other public lands.

America's population is growing 0.8% per year. Thanks to compound growth, this seemingly innocuous growth rate will do what larger growth rates do; it will simply take a little longer. The U.S. Bureau of the Census (1996) projects that America's population will rise from today's population of 268 million to 335 million by 2025. Compound growth at this same rate will double America's population in 75 years to more than half a billion people.

Moreover, the population of the United States is not expected to stop growing, because, as the Bureau of the Census reports, the global human population is growing at 1.56% per year—equal to about 90 million people. Immigration to America will inexorably increase as people across the world respond to the laws of economics and seek better lives. In 1996, immigrants accounted for 46% of the annual increase of 2.3 million in U.S. population. During the next century, according to the United Nations Population Fund, 94% of the world's population increase will occur in developing countries. In addition, the Population Fund estimates about 23% of the world's people, almost all in the developing world, live in absolute poverty, a condition described by former World Bank President Robert McNamara, as "so limited by malnutrition, illiteracy, disease, squalid surroundings, high infant mortality, and low life expectancy as to be beneath any reasonable definition of human decency." For these people, migration will often be the only way to find a better life.

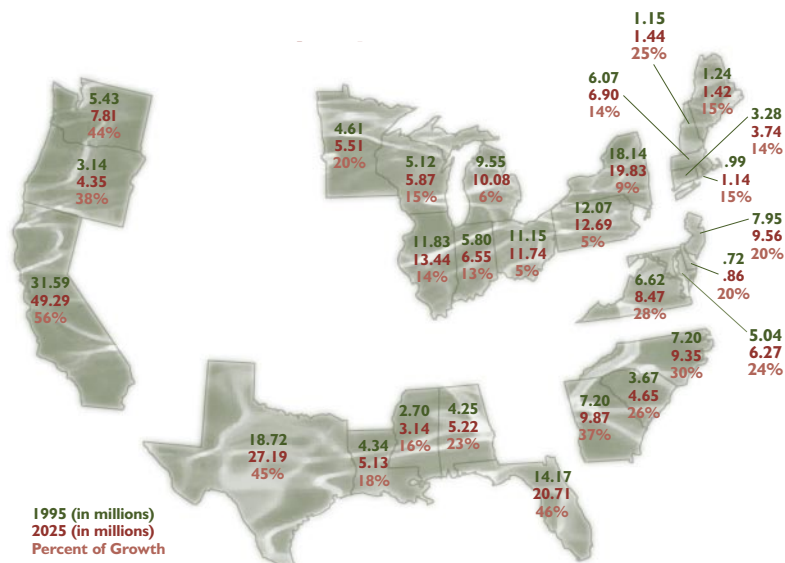
The pressure of population increases will be felt in every state, but most of all in the U.S. counties contiguous with coastlines, the Great Lakes, and the U.S.-Mexico border. For example, the population of U.S. counties and Mexican municipios along their international border increased by 830% between 1930 and 1990. According to demographers John R. Weeks and

Roberto Ham-Chande, this population of 9.34 million will double again in 22 years. The effects of people seeking to meet their basic needs in the arid Southwest are already conspicuous. The Río Grande below El Paso, Texas, is dry for most of each year. Due to continuing diversion from the Río Conchos watershed in Mexico, the Río Grande downstream in Big Bend National Park will likely become dry for part of each year.

Nearly half the U.S. population now lives within the 426 coastal counties, including the Great Lakes. Most of the population increase will come in these areas, where an estimated 1,000 acres of wetlands, the nurseries of the seas, are already being lost each day to development. Here and elsewhere, increased demand for minerals, water, fuel, fiber, and food will place unparalleled pressure on ecosystem functions.

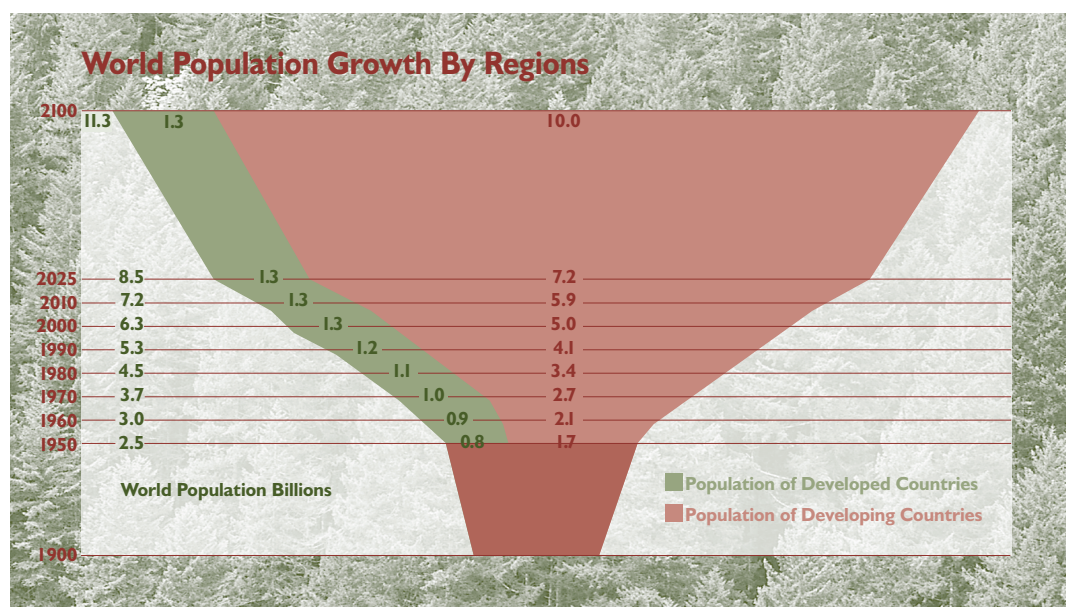
Non-point sources of pollution also continue to increase. The nearly parallel relationship between population increases and atmospheric carbon dioxide and methane levels will continue. In addition, direct exploitation of parks will increase as both immigrants and long-established citizens seek ways to make a living from park resources. Anything salable and easily harvested, plants, animals, fossils, or minerals, will suffer exploitation.

In a sustainable society, parks provide many things, including ecosystem maintenance, healthy recreational opportunities for people, laboratories where the fundamental workings of ecosystems are revealed, and



U.S. coastal states population growth
Source: U.S. Census Bureau Data

places where our natural and cultural heritage is preserved and discovered. But the welfare of parks is ultimately linked to the basic needs of the people of the world. If national parks and monuments are to survive with any semblance of environmental quality and integrity, the National Park Service must nourish public understanding that a sustainable society is possible only if its population is stable. The concepts of population dynamics and consequences of population growth must be fundamental parts of our educational programs. But this effort must also articulate the need to create sustainable societies around the world. Without global sustainability, national sustainability or the sustainability of parks is impossible.



World population growth

Internal threats Lake trout threaten native Yellowstone cutthroat

by Sue Consolo-Murphy

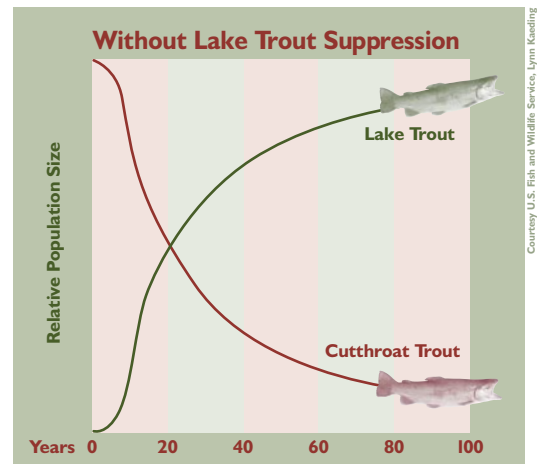
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In 1994, a visitor to Yellowstone National Park, Wyoming, caught a big, nonnative fish in Yellowstone Lake. Subsequent investigations confirmed the presence of a lake trout (*Salvelinus namaycush*) population, which poses a significant threat to native Yellowstone cutthroat trout (*Onchorynchus clarki bouvieri*) and to the associated food chain. The park's only native trout is already reduced to 10% of its original range as a species. At least 42 species—including threatened grizzly bears and bald eagles, ospreys, pelicans, otters, black bears, and numerous waterfowl—prey or scavenge on native trout, which spawn in small, shallow tributaries and frequent the surface waters of the deep lake. The larger, carnivorous lake trout live and spawn in deep waters, making them unavailable to most fish eaters, including anglers. A decline in the native fishery would also have serious negative consequences for the regional economy and recreational anglers.

Previous long-term monitoring—and most angling—efforts targeted only native trout, and thus failed to discover the lake trout invasion for at least two decades. Experts recommend “industrial-strength” gillnetting to control lake trout and new monitoring programs to evaluate control efforts. This requires additional staff

and equipment at a time of declining natural resource expenditures and, ironically, occurs just as the U.S. Fish and Wildlife Service (USFWS) closed its Fisheries Assistance Office, whose staff biologists had monitored and managed Yellowstone aquatic resources throughout the park's history.

In 1996, Yellowstone recruited a retired biologist, who volunteered as interim leader of fisheries management. One former USFWS biologist—enticed to change uniforms and stay with the park—traveled to the Great Lakes to learn about



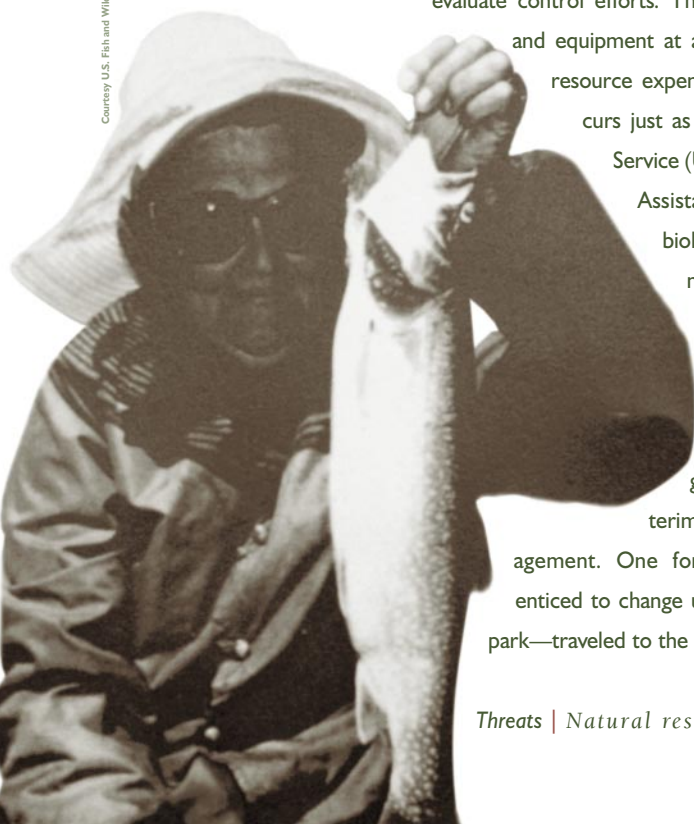
Left unchecked, nonnative lake trout numbers in Yellowstone Lake would be expected to rise, to the detriment of native cutthroat trout.



Fisheries biologists use gill nets to capture and control lake trout in Yellowstone Lake.

commercial gillnetting operations. According to lake trout experts, the good news is that our control efforts can be effective.

Last summer, biologists found a hotbed for lake trout spawning in the West Thumb of the lake. “Judas” fish were radio tagged and released so biologists can track them to gain information about how and where to control the invaders. That season, only two years after the discovery of the unwanted fish, 786 lake trout were caught by anglers and netting operations. The bad news is that the exotics, likely planted deliberately by some fan of “lakers,” may already number in the tens of thousands. Eradication is unlikely; long-term control is imperative to prevent the native Yellowstone cutthroat from becoming endangered.



Surprise! After reading a news story about the invasion of nonnative lake trout in Yellowstone Lake, a park visitor sent this photo of the lake trout she caught there.

External threats

The perennial push of exotic plants

by Gary Johnston

Nonnative plants are everywhere in the national park system and new invaders arrive almost daily. More than 194 parks have recognized the threat they pose to natural resources, and these parks have identified more than 550 project statements in their resource management plans to address this serious problem. In attempting to manage the exotic invaders, the National Park Service spends about \$2 million annually. However, the unmet needs detailed in these project statements exceed \$20 million each year. Thus, the National Park Service is only able to provide one-tenth of the needed resources to address this threat.

Despite this shortfall, many parks are actively engaged in efforts to manage nonnative plants. Sharp-eyed employees at Big Bend and Redwood National Parks spotted Russian thistle (tumbleweed) and yellowstar thistle in loads of gravel and fill brought into the parks and removed these species before they could become established. Jewel Cave National Monument, South Dakota, worked with surrounding landowners and the U.S. Forest Service to introduce biological control agents for leafy spurge. Use of the agents will likely eliminate the use of herbicides above the cave, reducing possible contamination of cave resources. These lands will also serve as *insectaries* where the multiplying insects are distributed to surrounding landowners. In similar efforts, Devil's Tower National Monument, Wyoming, and Theodore Roosevelt National Park, North Dakota, have distributed hundreds of thousands of leafy spurge biocontrol agents to neighbors. Through education, many parks are also increasing the awareness of the problems caused by invasive plants and are publishing informational brochures, developing Internet pages, or creating calendars featuring exotics. Lake Mead National Recreation Area,



Asiatic bittersweet
Celastrus orbiculatus



A resource manager sprays an herbicide to control the spreading exotic.

invasive Nonnative Plants on National Park Service Lands provides a blueprint for developing park-specific action plans for managing invasive plants. The plan emphasizes partnership activities and goals based on the principles of integrated pest management.

Going beyond the park focus, the National Park Service also worked with Department of the Interior and Department of Agriculture and other groups in 1996 to develop a national strategy for dealing with invasive plants. This strategy, called *Pulling Together A National Strategy for Invasive Plant Management*, is the first national model for addressing this significant threat to the nation's natural resources. More than 100 federal or state agencies or private groups have endorsed this strategy. However, the two strategies are only just beginning. Much work needs to be done to regain the lands from these invaders and to prevent new invasions from occurring.

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Nevada, and Great Smoky Mountains National Park, Tennessee and North Carolina, have developed exotic plant hit teams to assist other parks with management of these species.

An important development in 1996 was the completion of an exotic plants management plan for the National Park Service. *Preserving Our Natural Heritage: A Strategic Plan for Managing In-*

Native to southern Europe and Asia, musk thistle (*Carduus nutans*) is now widespread in the United States and Canada. It quickly colonizes disturbed areas such as roadsides.



Communication breakdown over drilling near Lechuguilla Cave

by Pat O'Dell and Frank Deckert

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Pipeline Profusion Oil and gas pipelines crisscross the national park system. A 1996 survey turned up 244 of the lines in 55 parks.

Last summer, Yates Energy Corporation drilled an explorative well on federal land just north of Carlsbad Caverns National Park, New Mexico. The location was in a canyon tucked out of sight from all but a few backcountry park visitors. The operator failed to find indications of petroleum, plugged the well, and quietly moved along. So, why did this seemingly innocuous act culminate five years of environmental and technical scrutiny, a strange mix of industry posturing and partnership, intense public involvement, a new federal law, and a lawsuit?

The controversy centered around drilling oil and gas wells into the same karst system that houses the Lechuguilla Cave, a world-renowned cave with exceptional formations unknown anywhere in the Western Hemisphere. To many, the proposal seemed to trivialize the very resources Carlsbad Caverns was created to preserve. Concerns focused on the operator's inability to ensure that drilling fluids, brine,

hydrocarbons, or poisonous gases would not contaminate the cave-forming strata.

The National Park Service had no permitting authority for the well, but cooperated with the Bureau of Land Management (BLM) to develop the Dark Canyon Environmental Impact Statement (EIS). Three years in the making, the EIS exemplified cooperation among government agencies, the environmental community, and the oil and gas industry. The record of decision was touted as one based on sound science. It established a no drilling "cave protection zone" and set strict drilling and production criteria aimed at cave protection where drilling would be permitted. Additionally, strong public involvement moved Congress to pass the Lechuguilla Cave Protection Act of 1993. The law withdraws lands in the cave protection zone from future mineral leasing and prohibits new drilling on existing leases. Lechuguilla was safe . . . or so it seemed.

After the law was passed, Yates Energy Corporation promptly sued the Bureau of Land Management claiming the cave protection zone and drilling restrictions amounted to a *takings* of their minerals, but the case never got to court. The bureau, independent of the National Park Service, agreed to settle. Settlement terms allowed drilling the well just outside the protection zone under standard lease terms. The special cave protection measures developed in the Dark Canyon EIS seemed to have been lost in the shuffle. The National Park Service again drew on its cave resource management and oil and gas expertise, and urged the strictest "standard" drilling stipulations to be reinstituted as cave protection measures. Though less restrictive than the EIS requirements, the measures provided the bulk of the intended EIS protections.

We did not expect that a breakdown in communication would occur so near the end of a project that was showcased for its collaborative efforts. Since BLM personnel were advised not to discuss the suit with outside parties, it may have been better if the National Park Service had been named in the lawsuit. Interagency cooperation would likely have been maintained, removing the need for last minute solutions.

When resources are threatened by activities outside a park, and even thousands of feet underground, effective communication with neighbors and supporters is paramount. In many instances, we will have to invite ourselves in the door.



Geologic Resources Division

The drilling rig was located 1½ miles from known passages of the world-renowned Lechuguilla Cave. Still, cave protection experts were concerned that the regional geology could potentially allow leakage from the well to flow into the cave.

Historic water rights settlement averts threats at Zion

by Dan McGlothlin and Bill Hansen

The East and North Forks of the Virgin River, the Weeping Rock, and other beloved water resources in Zion National Park are forever protected following five years of negotiation that culminated in a historic settlement in December 1996. Secretary Babbitt, Governor Leavitt, Zion Superintendent Falvey, and representatives from Washington and Kane Counties, Utah, signed an agreement for Zion recognizing the first federal reserved water right for a national park in Utah. Negotiators reached the settlement by avoiding common state and federal government rivalries and using scientific data to solve complex water rights issues. The agreement secures water rights to protect instream flows and groundwater in the park and provides a dependable water supply for local communities.

The NPS Water Resources Division initiated studies in 1987 to support water rights claims in the Virgin River Adjudication and to address the threat of proposed upstream dams. The studies estimated the amount of water necessary to support park purposes and maintain water resources in an unimpaired condition. Investigations included water and sediment discharge, age and origin of groundwater, channel-forming processes, riparian vegetation, native fisheries, aquatic organisms, hanging gardens, aesthetics, and recreational use. In 1992, the Park Service and attorneys from both the Interior and Justice departments reopened negotiations to quantify water rights for the park. The following year, a technical workshop helped to educate state and Washington County Water Conservancy District staff about NPS entitlement to and need for water rights at the park.

Equipped with a new understanding about the dependence of water-related resources on stream flows and groundwater in the park, the parties formed a technical team to develop and evaluate settlement proposals. All of the proposals offered park protection and state flexibility to develop a limited future amount of water. The team asked noted scientists to evaluate impacts of

current and future water development on flow regimes and water-related resource attributes in the park.

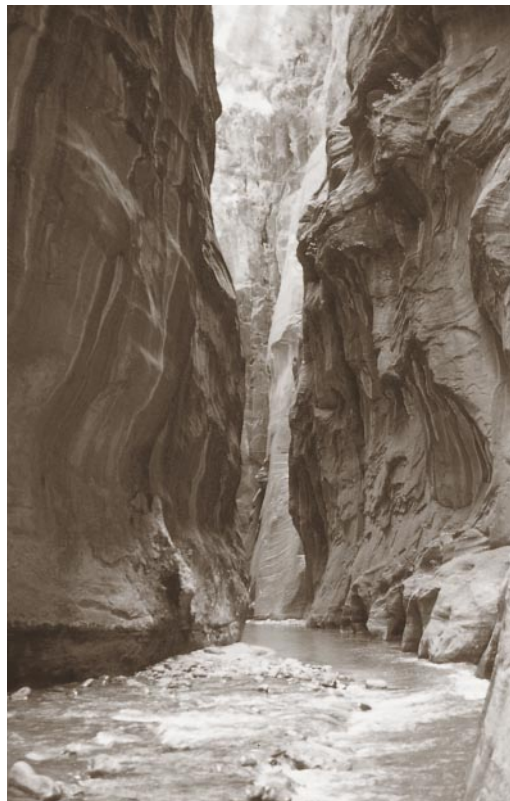
The final agreement recognizes a federal reserved water right to all the unappropriated flows in and above the park and allows valid existing uses to continue. It subordinates to a small amount of water development above the park and limits total depletion. It prohibits the construction of proposed dams on the East and North Fork of the Virgin River and a transbasin diversion to Cedar City. It also specifies diversion limits and periods, bypass flows, and groundwater protection zones. We doubt whether the National Park Service could have secured this impressive set of protections through litigation.

The historic agreement will need to be confirmed by the adjudication court before water rights are decreed. Should objections arise, Utah and Washington and Kane Counties have agreed to stand “shoulder-to-shoulder” with the Park Service in support of the settlement.

At the signing ceremony, the secretary and the governor encouraged the continued use of “good science” and cooperative efforts to solve complex water rights issues in Utah. This agreement establishes a process that can be used to complete settlements of this nature at other Utah parks.

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Canyon-forming water flows will continue to help preserve park features such as the Narrows under the recent water rights settlement at Zion National Park.



MEETING DEMANDS

Staffing, funding, professionalization, and reorganization all had broad implications for natural resource stewardship in 1996. Funds for natural resource stewardship continued to slide for the second year in a row while personnel and operating costs rose. Restructuring mostly behind us, we discovered some improvements in administrative operations, but the ever-evolving nature of this reorganization has led to communication challenges and many different approaches to implementing policy and carrying out natural resource programs. Despite these problems, we made some progress in the high priority area of professionalization, achieving an increase in the number of professional natural resource managers working in parks and realizing a significant in-house training opportunity for new resource managers. But given the complexity of natural resource problems and the pace at which they develop, is this enough?

Funding and staffing **Looking back on the budget; looking out for the future**

by Abigail Miller

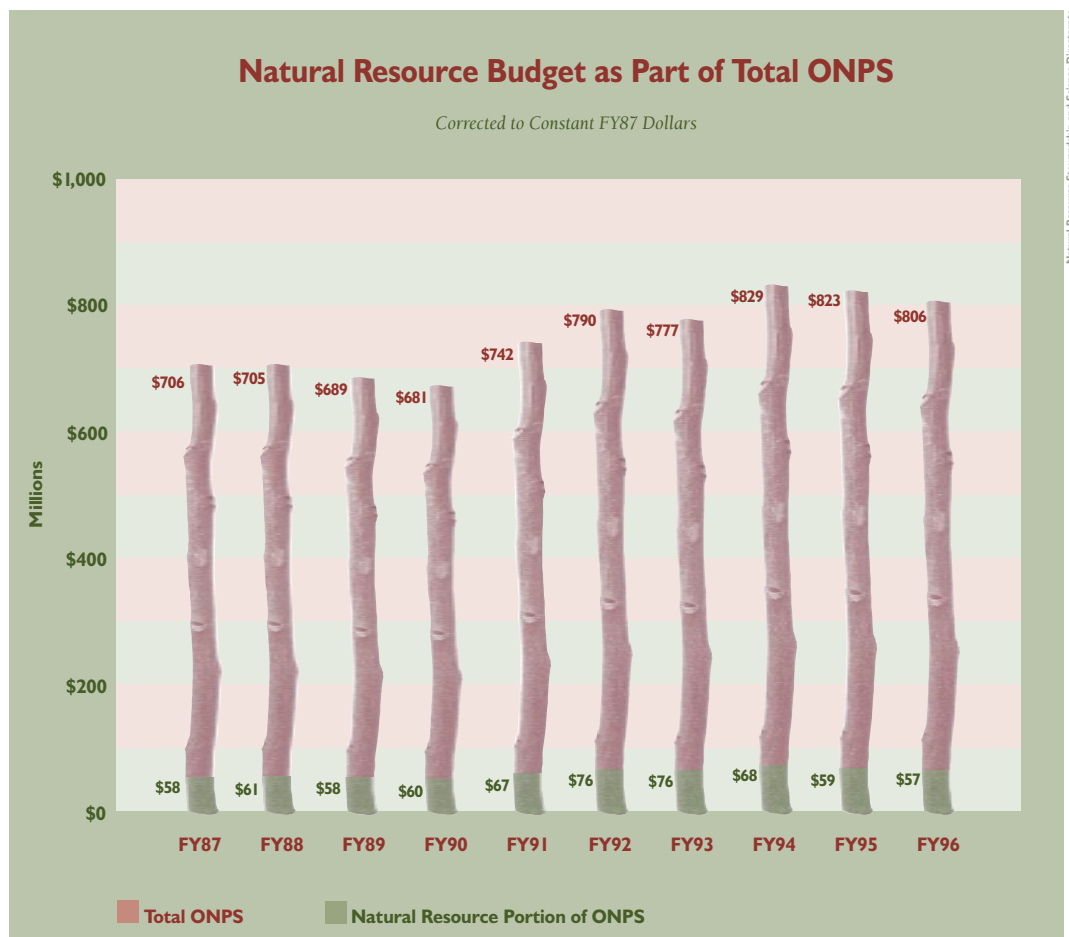
Fiscal year 1996 continued a downward trend in natural resource funding that began in FY95. In terms of actual dollars, constant dollars, and percent of the operation of national park system (ONPS) appropriation, FY95 and FY96 natural resource funding declined approximately 12% while the total ONPS appropriation grew 2% over the FY94 level. Despite the transfer of \$20 million to the National Biological Survey (NBS, now USGS Biological Resources Division—BRD) in FY94, natural resource funding went up slightly that year from FY93. Expenditures for natural resource management for FY96—actual expenditures, rather than projected expenditures presented in the budget—were about 3% less than appropriated. Although regional and support office funding is only 10–11% of total funding, expenditures at this level declined 16% in FY95 and FY96, contributing to this overall decline.

The ONPS appropriation is the largest of five principal appropriations for the National Park Service, accounting for 82% of all NPS funds, and contains most natural resource-related funding. Elsewhere, \$916,000 is included for the National Natural Landmarks Program and \$338,000 for environmental compliance activities, but this discussion focuses on ONPS funds only. In addition to a small administrative costs category, the ONPS appropriation has four major subdivisions; maintenance (32% of total ONPS in FY96), visitor services (23%), park support (20%), and resource stewardship (16%). This last category includes cultural resource research and resource management, natural resource research and resource management, and resource protection (i.e., ranger resource protection patrols).

In FY96, over two-thirds (approximately \$52.4 million) of the \$76.4 million in ONPS funds allocated to natural resource management and science went to the field (parks, support offices, and regional offices). The remaining \$24 million funded the Natural Resource Program Center and the Washington Office Natural Resource Stewardship and Science Directorate. Much of these funds went to parks in direct project dollars (about \$8 million in Natural Resource Preservation

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Natural Resource Stewardship and Science Directorate

Sharing Costs

Approximately \$400,000 (28%) of the \$1.1 million available for park projects in FY96 Challenge Cost Share Program funds were used to support at least 36 natural resource preservation, study, or rehabilitation projects.

Program, water resource, and GIS projects), centralized acquisition of park data (e.g., inventories), and technical assistance.

Two observations can be made about the recent downward trend in natural resource funding. First, following establishment of the NBS in October 1993, funding for natural resource management has declined slightly. Between FY87 and FY93 (for which figures are readily available) natural resource line items increased 53%. Since then, natural resource initiatives have not been as successful. Second, natural resource-related appropriations for the field dropped 18% in FY94 and FY95 while overall park appropriations rose 6.6%.

Natural resource management funding in parks is not dictated by the portion of park funding described for resource management in the budget request, but by the amount that superintendents elect to assign to this function. Additionally, the NPS budget tracking system does not distinguish between some types of resource management activities. For example, under this system, both foot patrol and visitor management in wilderness are

classified as “resource management” expenditures, on a par with scientifically established monitoring activities. This is important because future budgets are based on these figures, which are not very precise in measuring park resource management activities. During this period of declining park natural resource expenditures and slightly increasing overall park funding, parks were required by two different initiatives to increase grades and salaries of rangers and take on additional benefit costs in converting many temporary employees to term or permanent staff. These and other types of cost increases reduce the flexibility of superintendents in allocating increases.

As long as natural resource funding initiatives are relatively unsuccessful and superintendents are pressed to fund aspects of park management other than natural resource management, the downward trend is likely to continue. On the other hand, the FY98 budget forwarded to Congress could change that trend, due to significant nationally focused initiatives, all of which provide direct assistance or project funding to parks.

A first for National Park of American Samoa

by Bob Cook

The year 1996 marked a milestone for the National Park of American Samoa and its natural resource management program. At a time when few parks are seeing staff increases, the National Park of American Samoa in the South Pacific experienced a 50% increase, as a wildlife biologist signed on. Though a workforce of three is still extremely small for a park this size (10,520 acres on three islands), placing a wildlife biologist here was a significant decision in keeping with the unique nature of the park.

When Congress authorized the park in 1988, the National Park Service embarked upon a journey into new biomes and new approaches to park management. Created to preserve Old World, mixed-species rainforest and the flying foxes (large fruit bats) that inhabit it, the park also encompasses some of the finest examples of Indo-Pacific coral reef, with species richness greater than found in Atlantic reefs. Also unique is this park's approach to management, rooted in the traditional land tenure system of American Samoa. Here, lands are held communally by villages, with all land use decisions being made by village councils, composed of the matai (head) from each of the villages' extended families. Thus, instead of owning park land, the National Park Service leases it from the eight villages that comprise the park,

and works closely with village councils in developing and implementing park programs and regulations.

The decision to employ a wildlife biologist at the park resulted from the convergence of a number of NPS programs, and is a reflection of the importance placed on the natural resources. Key among these programs was the Natural Resource Management Assessment Program (NR-MAP). NR-MAP analysis indicated that the park needed the equivalent of 24 positions to conduct a comprehensive natural resource program. Based on this analysis and follow-up prioritization by the Pacific-West Region, the wildlife biologist position for the park was ranked the number-one priority in the region.

Having a biologist on staff at this early stage is a critical step toward achieving our resource stewardship goals. The park is still very much in the planning and development stages, and a staff biologist better ensures a plan with minimal resource impacts. Since arriving in American Samoa in 1996, the biologist has begun surveys of resource conditions, mapping significant features such as colonies of roosting fruit bats and seabirds, and areas of feral pig damage. Proposed trail routes are being evaluated for potential impacts long before construction funds are obligated.

While one biologist, aided by volunteers, is far from a full-blown program, it is a significant start. It accelerates the development of a more comprehensive natural resource management program as threats and issues, identified in planning documents, are reevaluated in depth. Individual, broadly focused project statements

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Preservation of flying foxes was a prime impetus in establishing National Park of American Samoa.

National Park of American Samoa comprises three islands in the South Pacific. Beautiful beaches, rugged topography, and one of the most pristine and diverse coral reefs in American Samoa are features of the Ofu park unit.



NPS photo by Doug Culland

in the park resource management plan are being expanded into several statements, each detailing specific steps needed to evaluate and respond to an issue. Having a biologist to separate large issues into smaller, more discrete components has led to increased success in obtaining project funding. As a result of efforts in 1996, the park obtained funding to conduct a detailed survey of Laufuti, the park's principal perennial stream and a likely destination for visitors to the park's Ta'u Unit. Being able to quantitatively assess a resource condition before receiving visitation is certainly a strong argument for placing a resource specialist in a park at the very beginning.

While few national parks had the benefit of a professional biologist on staff at their outset, it is now fairly well accepted that parks with significant natural resources require resource specialists to accomplish resource stewardship goals. Based on a recent analysis of NPS natural resource personnel, of the approximately 250 parks with significant natural resources, roughly 90 still lack their first professional natural resource manager. Additionally, 107 of these parks have no staff classified in biological or physical science personnel series. While additional staff are difficult to fund, the long-term benefits—more effective stewardship of park natural resources—is certainly worth the cost.

Professionalization The Resource Careers Initiative

by Kathy Davis

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If the National Park Service is to be successful in protecting and preserving nationally significant natural and cultural resources, it must implement a human resources program to meet the stewardship needs of the agency. For this purpose, the National Park Service launched the Resource Careers Initiative in 1994 as part of the *Vail Agenda*. A national team of resource managers, personnelists, and classifiers assembled and defined issues, selected occupational series, and con-

ducted extensive fact-finding position reviews at 13 parks and a museum center.

In examining 125 positions, NPS personnelists found that the minimum full-performance level for professional resource management positions is clearly GS-11. However, some professional positions are filled with people lacking expertise or education to perform professional work or are hired below the skill and grade level needed for the job. Concurrently, many well-qualified technicians are performing professional work not reflected in their grades or position descriptions (PDs). Also, in some parks, full-time resource managers are classified in the wrong occupational series, typically the GS-025 park ranger series, which the Office of Personnel Management defines as a nonprofessional, administrative series.

This situation raises classification and position management concerns. As the personnelists discovered in their interviews, generalists are often attempting to perform professional-level work. For budgetary or downsizing reasons, professional work is being diluted as staff are assigned other types of work. Additionally, the personnel team observed that resource managers feel they are more successful in competing for resource-related budgets and priorities if the resource management function reports to the superintendent or assistant superintendent.

In August 1996, the team worked on implementing the resource careers recommendations by writing PDs



A resource manager at Hagerman Fossil Beds National Monument, Idaho, uses a laser transit and global positioning system to inventory fossil resource sites.

for 20 occupational series for the GS-II minimum performance level work. Career entry and ladders were provided with benchmarks at the lower grade levels. Thus, a qualified person can enter at the GS-5, 7, or 9 level and advance noncompetitively to GS-II based on performance. Establishing this ladder creates the foundation for professional resource careers within the National Park Service and recognizes the expertise needed and the value of the work.

The team distributed the draft PDs and an implementation plan for review in December, and over 250 parks returned worksheets identifying staff who would need to have their grades or positions adjusted to match

the level of their work. In late January 1997, the associate directors for natural and cultural resources presented these results and the estimated costs to the NPS National Leadership Council. This group endorsed the findings and will seek funds for fiscal year 1999 to implement the initiative. If the money is received, implementation will occur; if not, it will be optional. Meanwhile the PDs can be used as intended. The resource careers team will continue writing PDs for the GS-II professional series and benchmarks for the technician series, but will not seek funding for these positions.

Managers and resource staff must keep the initiative at a high profile so it does not fade away.

Resource management fundamentals training debuts

by Dennis Vásquez

A new era in the professional development of NPS natural resource managers began in May 1996 with the inaugural session of the "Fundamentals for Natural Resources Managers" training program. The six-week long program was held at the Albright Training Center at Grand Canyon National Park, Arizona, with field trips to Lake Mead National Recreation Area and Flagstaff, Arizona. Twenty-three resource managers took part in the program.

The need for such a training program had been identified in a number of recent reports including the *Vail Agenda* (1992) and the *Strategic Plan for Improving the Natural Resource Program of the National Park Service* (1995). Dozens of individuals were involved in the development of the syllabus for the training course.

The fundamentals course is designed to enhance the academic training of new employees in professional natural resource management positions with knowledge specific to the management of natural resource programs in the National Park Service. Graduates of the course will be able to apply laws, policies, agency expertise, public input, and research information into park resource management operations. Two major themes ran through the

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Trainees of the first "fundamentals" course toured Lake Mead National Recreation Area, Nevada, to gain insights on restoring slow-growing native vegetation to abandoned or closed dirt roads.



Natural Resource Information Division

Professionals On Rise

Between 1993 and 1997, professional natural resource management positions in parks increased by 136. Not all are new positions, as many resulted from reclassification, and some are in interpretation or maintenance divisions, rather than resource management. Still, this represents a 33% increase since 1992.

course: (1) an ecosystem approach to management; and (2) planning and implementing a resource management program to include natural resource, cultural resource, and social science considerations.

In a year when funds for training were scarce throughout the Park Service, the National Parks and Conservation Association (NPCA), the National Park Foundation, and the Natural Resource Stewardship and Science Directorate joined to provide the financial support to conduct this foundational piece in the training strategy for natural resource managers. Regional directors of NPCA participated and added a valuable component to the class.

Class participants left the program with more knowledge, more tools, a larger network of contacts, and a deeper sense of commitment to the stewardship mission of the National Park Service. In a letter signed by all graduates of the first “fundamentals” class, participants committed themselves to taking an integrated approach to resource management, cultivating partnerships, endorsing a strong science program, advocating career pathways for resource managers to achieve high-level positions within our agency, and taking an active role in the leadership of the National Park Service.

Reorganization Are we flourishing yet?

by Bob Krumenaker

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“Natural resource management will flourish if sufficient numbers of well-trained staff are provided at all levels of the restructured NPS.” That was the fundamental statement of the 1995 *Report of the Ad Hoc Working Group on Natural Resource Management in the National Park Service*, convened at the behest of then Assistant Secretary for Fish and Wildlife and Parks George Frampton. He had approved the 1994 NPS restructuring plan upon the condition that the Park Service make “natural resource management flourish” in the future.

Restructuring was supposed to accomplish a shift of resources to the lowest levels to help parks meet their responsibilities, and some of this happened. At the end of 1996, there were more natural resource management professionals in parks than in 1995. As expected with this reorganization, significantly fewer resource professionals were in support offices, including the Natural Resource Stewardship and Science Directorate, at the end of 1996 than in 1995. However, the numbers do not paint the entire picture.

Many parks are now doing what former central office staff once did and finding they have less time to accomplish their own park needs. Ironically, the greater the expertise in the field, the greater the demand the field resource managers have for technical assistance.

Staff that remain in central offices find themselves less able to provide service to the field, due to fewer numbers and the demands of the new and different bureaucracies that have developed in place of regional offices. Coordination and consistency between offices is a struggle and technical expertise in central offices, and in some offices of the USGS Biological Resources Division, has decreased dramatically.

There are also several successes to report. Some of the increase in natural resource positions in the field has come from superintendents who have voluntarily restructured their own workforces. More parks are sharing staff. Some new professional “circuit rider” positions have been established, providing expertise to several parks. Remaining project funds appear increasingly to be going to small parks that had trouble competing under the old system. Both clusters in the Midwest have chosen to assess their own park bases to create new sources of funds for critical projects. Parks in the Northeast have developed a Natural Resources Strategic Plan that calls for no net loss in natural resource positions or funding. The managers support the plan, and it is working. The lack of clear central office structure has also allowed ad hoc personnel assignments on strategic issues, such as aircraft overflights in the Intermountain Region.

The picture as a whole shows some promise, but many in the ranks are disillusioned. Our preoccupation with restructuring in times of limited budgets has precluded the major reinvention that we had hoped for.

The Natural Resource Program Center

by Dan Kimball

The National Park Service established the Natural Resource Program Center in mid-1996 as part of its restructuring effort. The center is a key component of the Natural Resource Stewardship and Science Directorate and was created to provide specialized advice and assistance to parks in the protection and management of natural resources, particularly in physical sciences and natural resource disciplines most lacking at parks. Another major goal was to increase the efficiency of providing services to the parks and in administering the various programs of the center.

The center comprises five divisions: Air Resources, Environmental Quality, Geologic Resources, Natural Resource Information, and Water Resources divisions. The center concept enhances communication and coordination among the divisions, resulting in improvements and increased effectiveness in each program area; it also increases efficiency as administrative staff are shared between divisions. Staff of these divisions are located primarily in Colorado, and the center is managed by a leadership council with chairmanship rotating annually.

Each division works both independently and cooperatively, depending on the nature and scope of a particular natural resource issue, activity, or project. In addition to providing specialized expertise in physical and natural sciences, the center also provides policy, regulatory, and permitting assistance to parks; assists in the development of NPS natural resource guidelines; promotes and facilitates interagency and external partnerships; and, on a national basis, compiles and synthesizes natural resource information. Staff of the program center also work closely with the Natural Systems Management Office of the Natural Resource Stewardship and Science Directorate, which provides leadership on major biological issues and in understanding and managing parks as part of larger landscapes or ecosystems.

One tool that has helped the program center integrate its natural resource management programs with other agencies is the part-time placement of technical staff in the offices of cooperating science agencies. The Water Resources Division, for example, works with both the USGS Water Resources Division and the U.S. Fish and Wildlife Service to increase efficiency, break bureaucratic barriers, and share resources. Respective goals of these collaborations have been to increase water-quality data collected in



The Northern Pintail (*Anas acuta*) is a common North American duck that relies on healthy freshwater habitats in numerous NPS units.

parks through the National Water-Quality Assessment Program (NAWQA) and examination of the potential risks to waterfowl and shorebirds at parks and refuges from the ingestion of lead fishing sinkers. Likewise, the Geologic Resources Division has established liaisons at each of three USGS regional offices across the country, resulting in many projects in the areas of park mapping, research, and visitor education.

Although it has been in existence for only a short time, the Natural Resource Program Center has been effectively involved in several significant natural resource issues, such as the proposed New World Mine near Yellowstone National Park, a large landfill proposed adjacent to Joshua Tree National Park, and minerals management planning at three parks in Texas. Staff have also worked together in developing and implementing a number of multidisciplinary natural resource programs, such as abandoned mine lands restoration, natural resource damage assessment, and inventory and monitoring.

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Using the social sciences

In 1996, the National Park Service established a Social Science Program within the Natural Resource Stewardship and Science Directorate. Just under way, the program adds to our capacity to manage natural resources based on sound scientific information.

Yellow monkey flower (*Mimulus guttatus*), Bright Angel Creek, Grand Canyon National Park, Arizona.



RESOURCE KNOWLEDGE

Inventory and monitoring (I&M) are among the most basic tools that enable resource managers to establish baselines and measure change. Data gathered through I&M activities help counter threats and substantiate resource management, improving our effectiveness and credibility as resource stewards. We saw progress in this area in 1996 with many parks collecting and analyzing data and taking action on various problems. The national I&M Program also progressed as some parks were finally able to begin staffing their I&M operations; however, this program is well behind in its timetable to bring all prototype monitoring parks up to speed, due to limited funding.

Inventory and monitoring in the national park system

by Gary Williams

With a mission to conserve the natural and cultural resources and values of the national park system unimpaired for the enjoyment of this and future generations, the National Park Service has an awesome responsibility. We are currently unable to attain this mission, owing to a serious lack of scientific information about the nature and condition of resources in many parks. In addition, we typically lack the expertise needed to monitor resource conditions over time and formulate management strategies to deal effectively with the myriad threats and issues impacting those resources.

To address this general lack of credible information and monitoring expertise, Congress funds the Inventory and Monitoring (I&M) Program of the National Park Service. This program coordinates systematic efforts to acquire 12 basic data sets for each of the more than 250 parks with significant natural resources. These inventories include an automated, historical database (bibliography); park surveys of vascular plants, vertebrates, threatened and endangered species, and other species of special concern; vegetation, geologic, and soils maps and cartographic data; water resource inventories; air quality information, including air quality-related values; and basic precipitation and meteorological

data. Collectively, these data sets represent the minimum scientific information needed to manage park natural resources.

In addition to the resource inventories, the I&M Program also establishes prototype long-term ecological monitoring programs in parks. These programs develop and test cost-effective methods for monitoring park ecosystem status and trends over time and formulate management strategies to cope with threats. Both the resource inventory and long-term monitoring efforts are assisted by the USGS Biological Resources Division and other federal agencies.

The I&M Program has made substantial progress in completing park resource inventories and initiating prototype monitoring programs. Through 1996, bibliographic databases have been funded for 256 parks, existing park species information has been validated for approximately 95 parks, and base cartographic data sets have been acquired for 130 parks. Vegetation mapping is under way in 32 parks and soils mapping in 21 parks. In addition, 7 prototype long-term monitoring programs have been initiated, with 4 other such programs selected for design.

An estimated additional \$75 million will be needed to complete the resource inventories and fully implement the 11 prototype monitoring programs. At current funding levels, nearly 20 years will be required to complete all of these projects. Lack of future funding could jeopardize our ability to protect natural systems in a timely manner.

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A scientist gathers forest health data, Sequoia National Park, California.

Geographic Information Systems GIS comes of age

by Leslie Armstrong

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More parks than ever used Geographic Information Systems (GIS) in 1996 to convey and create new information in support of park management. Among those uses were map publication, fire management, park planning, and data integration and analysis. The development, growth, and decrease in costs of desktop (personal computer) GIS, park data availability, and the ability of the National Park Service to provide technical support to parks using GIS is revolutionizing the way parks work with information.

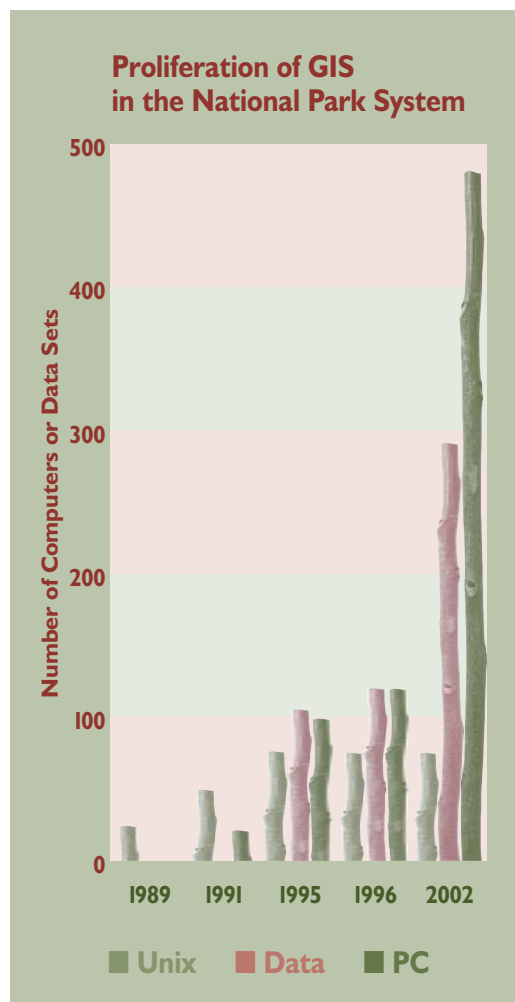
GIS has become easier to use recently with the introduction of ArcView™ software. ArcView™ allows users to view, map, integrate, and analyze information on a personal computer (PC). The introduction of ArcView™ is partly responsible for the increased use of

GIS in parks, including all parks in the National Capital and Alaska Regions and the Columbia-Cascades Cluster. The use of ArcView™ over a parkwide computer network with a computer that provides data is the latest GIS trend called “distributed GIS.” This enables any park staff using a network-connected computer to access GIS tools and a variety of park data. For example, Sequoia-Kings Canyon National Park has 10 ArcView™ licenses available on their network with 10 more planned in the near future.

The contrast between the current desktop units and older systems is striking. Mainframes and UNIX workstations were once the only option for GIS, and somewhat of a nightmare for parks. The systems were expensive, difficult to use and maintain, and required a full-time GIS specialist. However, GIS has evolved into an inexpensive, user-friendly desktop tool that can be used by trained park staff, not just the GIS specialist. Although approximately 67 UNIX GIS systems still exist in the national park system, they are mostly located at larger parks and the nine GIS Field Technical Support Centers where greater support for these systems usually exists.

Should parks need support, they can rely on the Field Technical Support Centers (FTSCs) to do the heavy computing required for database construction and complex analysis and modeling. This allows parks to focus their use of GIS on projects and management issues. Additionally, FTSCs are a source of GIS training and consultation in resolving problems or questions. They also coordinate funding, implementation, and data acquisition such as vegetation mapping.

In 1996, new GIS funding in the amount of \$800,000 provided a head start for two new FTSCs—at Hawaii Volcanoes National Park and the University of Rhode Island. This budget also allowed further development of the seven existing centers at the University of Wisconsin—Madison, North Carolina State University, University of New Mexico, National Capitol GIS FTSC, NPS—Denver, Alaska GIS Division, and Columbia-Cascades/Pacific Great Basin—Seattle. These centers currently support about 156 parks with a target implementation of approximately 258 parks that have GIS needs. The proliferation of GIS in recent years is certainly a good sign for science-based park management.



I&M Program accomplishments for 1996

by Gary Williams

Cape Cod National Seashore

- Established a cooperative agreement with the USGS Biological Resources Division through the University of Rhode Island
- Established a technical oversight committee for the monitoring program
- Initiated efforts to hire a full-time I&M coordinator

Channel Islands National Park

- Hosted inventory and monitoring training course for 30 NPS natural resource specialists
- Assisted Point Reyes National Seashore and Golden Gate National Recreation Area in the development of an ecological monitoring program

Denali National Park And Preserve

- Hired both a full-time coordinator to manage the overall prototype monitoring program in the park and a term-appointment physical science technician with expertise in glacier and weather monitoring
- Strengthened the conceptual framework of the monitoring program through two workshops that improved program objectives; developed solid linkages between management needs and information gained through monitoring; discussed expanding the current watershed focus to include a multiscale program that would discern ecosystem change at several spatial and temporal scales
- Field-tested techniques for monitoring glaciers with final protocols expected by fiscal year 1998.

Great Smoky Mountains National Park

- Began to mesh monitoring studies for acid deposition and water quality, aquatic macro-invertebrates, and fish

- Sought external funding that is providing major inventories in neotropical migratory birds, spiders, and other biologically diverse groups

Prairie Park Cluster

- Documented a significant decline in stream water quality at Wilson's Creek National Battlefield, Missouri, and will use monitoring results to help prevent placement of an additional sewage treatment plant in the Wilson's Creek watershed

Shenandoah National Park

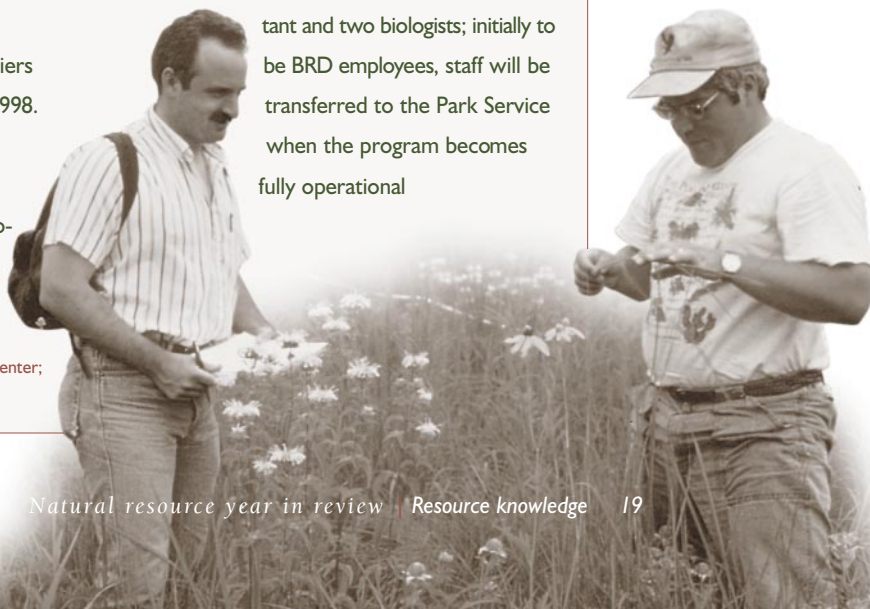
- Documented tremendous recovery capability of fish populations following the floods of 1995; large numbers of fish were found in sections of streams where almost 100% of the fish were absent immediately following the floods in the previous year
- Revealed through monitoring that visibility in the park improved in 1996, probably the result of higher than normal rainfall
- Revised fisheries monitoring protocols to standardize data collection for all species and for data comparability with Great Smoky Mountains National Park

Virgin Islands National Park

- Initiated efforts to hire full-time I&M coordinator
- Initiated efforts to hire an administrative assistant and two biologists; initially to be BRD employees, staff will be transferred to the Park Service when the program becomes fully operational

Resource managers monitor prairie forb establishment at Wilson's Creek National Battlefield, Missouri.

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Air resources

New ozone standards and the NPS monitoring network

by David Joseph

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Since the early 1980s, the National Park Service has monitored the levels of the air pollutant ozone at many parks. Ozone monitoring is important to the National Park Service because ozone is particularly poisonous to vegetation, and ozone levels measured in many parks exceed threshold levels above which vegetation injury may occur. In December 1996, the U.S. Environmental Protection Agency (EPA) proposed new ozone air pollution standards that are designed to protect humans and vegetation from the effects of the pollutant. What is the significance of these new standards to the National Park Service? The data collected in our ozone monitoring network have helped answer this question.

Based on the most recent data collected in the network over a three-year period, at least eight parks are out of compliance with the proposed EPA “primary” standard to protect human health: Cape Cod National Seashore, Cowpens National Battlefield, and Great Smoky Mountains, Joshua Tree, Sequoia-Kings Canyon, and Shenandoah national parks. As illustrated in the map,

at least 11 parks also do not meet the proposed “secondary” standard that EPA has suggested would protect park resources from the adverse effects of ozone. States that have areas in “nonattainment” of these national ambient air quality standards must design and enforce air pollution control programs to decrease the amount of ozone in the air to levels below the standards.

More parks may fail to meet the proposed EPA ozone standards than the ones indicated in the illustration; only parks with ozone monitors were included in this analysis. If more areas had monitors, we would likely have determined that additional parks were out of compliance with the proposed standards. Our ability to monitor at new and existing sites has been seriously compromised over the last six years. Since 1991, our network of long-term air quality stations has shrunk from 42 to 33. Increasing operational costs without accompanying budget increases for monitoring accounted for these shutdowns. These developments jeopardize our ability to maintain long-term monitoring networks necessary to assess the conditions of, and trends in, air quality in national parks. Further reductions in the long-term monitoring network likely will continue as a result of government downsizing and our inability to replace some aging and outdated monitoring equipment. However, a proposed FY98 budget increase would offset increased monitoring costs.

Based on air quality monitoring data collected from 1993–95 in these units of the national park system, 11 parks did not meet the newly proposed EPA ozone secondary standard.

Source: 1993–95 NPS and state data.

▲ Site did not meet EPA proposed ozone standard at least once in 1993–1995

● Site met EPA proposed ozone standard in 1993–1995



Wildlife and vegetation

The information link to preserving endangered species

by Peggy Olwell

Because only a few individuals exist in a few populations, endangered species are inherently difficult to manage. This problem is exacerbated by a lack of knowledge of the locations and numbers of endangered species on park lands. Consequently, NPS management decisions relating to endangered species must often be made with incomplete information. For example, a trail crew lacked information on the whereabouts of a rare paintbrush (*Castilleja*), which resulted in the loss of the population when the trail was widened. On the other hand, Sneed's Pincushion Cactus (*Coryphantha sneedii* var. *sneedii*) occurred in larger populations and more localities than was known before a survey, and the species was taken off the list of endangered species. As these examples indicate, lack of endangered species information has a bearing on both the level of protection achieved in the field and the management energies expended on species preservation.

To help counter the information deficit, the National Park Service signed a cooperative agreement with The Nature Conservancy in September 1996 to develop a national database on federally listed, candidate, and globally rare plants and animals occurring or potentially occurring on park lands. The project will involve a cooperative effort between The Nature Conservancy, the National Park Service, and state heritage programs to determine the best initial sources of information, develop data sets for each park, and review and reconcile the data. This joint project will produce a database on reported or potentially occurring nationally significant plant and animal species, their federal and state endangerment status, and their domestic and international distribution. It will also detail the units in the national park system that report the same species.



Swamp Pink



'Ahinahina or Silversword



Snail Kite

any endangered, threatened, or significantly rare plants and animals.

Unfortunately, lack of information is not the only problem we face in caring for endangered species. In 1995, expenditures for the recovery of endangered species in the national park system hit an all time low at \$2.6 million dollars; this development further hampers our ability to properly care for endangered plants and animals.

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In addition to local-level information, the National Park Service will gain a national picture of endangered species on park lands. This will enable us to determine our responsibilities under the endangered Species Act, seek funding for the preservation of Endangered species on park lands, and determine those parks that need to be inventoried for endangered species and those species that need to be monitored. This information will help the National Park Service avoid losing populations of

Highly vulnerable to destruction, the Tennessee purple coneflower (*Echinacea tennesseensis*) grows in shady cedar glades. The plant's habitat in an area undergoing rapid residential development.



WORKING TOGETHER

In 1996, the National Park Service established or refined many partnerships that helped advance the state of natural resource management in parks. Some involved finding organizations interested in funding natural resource activities, while others concentrated on sharing resources to meet common goals. Without partners, we would not have access to some of the technical specialties needed in our work, yet lacking in our organization. But partnering goes beyond the exchange of funds and expertise. It fosters better interagency understanding and the discovery of common ground, promotes innovation, and galvanizes support in attacking complex issues. As has been the trend over the past several years, partnerships continue to be an area of expansion for the National Park Service and will continue to be critical to our success in natural resource management in the future.

The teamwork trend in Hawaii

by Rick Potts

Funding and staffing levels combined with the continual reorganization of research scientists have increased the difficulty of accomplishing projects that protect natural resources throughout the national park system. Pressures on the resources themselves also continue to mount. In Hawaii, park resource managers and scientists have adopted a cooperative strategy to combine forces and expertise to complete urgent resource management projects, and the whole is definitely greater than the sum of its parts. In smaller parks, such as Kalaupapa National Historical Park, developing, organizing, and completing large natural resource management projects would simply not be possible, given the very small staff and logistical constraints, without the support of Hawaii Volcanoes and Haleakala National Parks, the University of Hawaii Cooperative Park Studies Unit (CPSU), the Pacific Islands Support Office, and the Pacific-West Region. Additional critical help has come from the NPS Water Resources Division and park field stations of the USGS Biological Resources Division (BRD).

Good examples of this cooperative spirit are evident in recent and ongoing fence enclosure construction

projects at Kalaupapa. With the assistance of the Haleakala BRD Field Station and the resource management staff of Hawaii Volcanoes, the park constructed a fence nearly 3 miles long around a volcanic crater containing rare, remnant, Hawaiian dryland forest. This forest was being severely degraded by marauding nonnative pigs and a rapidly growing population of nonnative axis deer. These efforts occurred just in time to save this very special resource, one of the last remaining dryland forests of its type. Newly sprouted seedlings of the native wili-wili tree are being seen in the crater for the first time in years since the exclusion of pigs and deer.

Another fence-building project was under way at Kalaupapa in 1996, this one designed to protect several federally listed endangered plant species and a fine example of native coastal strand vegetation. This area is being besieged by more than 500 axis deer nightly, and time is running out for the remaining coastal plants. Again, park partners have assisted with the vegetation surveys, management recommendations, administrative support, materials procurement, and construction of the mile-long fence.

With this kind of cooperative spirit, Hawaiian parks will continue to strive to accomplish more with less. There is no choice—native ecosystems in Hawaiian parks are being rapidly degraded, and the natural resources cannot wait.

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Hapu'u (*Cibotium glaucum*),
a native fern at Hawaii Volcanoes
National Park.

Alternative funding Big rewards possible with corporate partners

by Lissa Fox

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To resource managers faced with limited staffs and budgets, partnerships can look a lot like the proverbial pot of gold at the end of the rainbow.

Partnerships seem particularly irresistible when the potential partner is a large corporation with millions of dollars to donate. Once park managers stop imagining all the good work they could accomplish with such donations, however, the questions began to arise. What are the costs associated with these gifts? Could corporate partnerships tarnish the pristine image of the National Park Service? Would resource managers have to compromise established management priorities based on corporate needs?

These and many more questions were asked when the National Park Service entered into a partnership with Canon U.S.A., Inc., and the National Park Foundation in 1995. The program, called *Expedition Into the Parks*, brings together volunteers, the National Park Foundation, Canon, and the parks to advance natural resource management in the parks and to educate the public concerning NPS natural resource issues. In *Expedition*, none of the previously mentioned concerns came about; in fact, the program has been an unqualified success.

What has the Park Service received from this partnership? The National Park Service gets direct financial support for natural resource management work in the parks. In 1995, *Expedition* funded 20 biological inventory and monitoring projects. In 1996, 15 of the original 20 projects received second-year funding to conduct restoration work based on the information gathered the first year and to produce educational materials in conjunction with the projects. Total funding for the 1995-96 program was over \$1 million (including dollars and equipment). Fourteen parks will benefit from *Expedition's* \$1.1 million program in 1997.

The National Park Service also received extensive media coverage of natural resource issues, resulting in raised public awareness of the preservation challenges the parks face. Newspapers around the country covered



Santa Monica Mountains National Recreation Area

Scientists prepare a photography station that will allow a large mammal to trip the shutter and take its own picture. The study in Santa Monica Mountains National Recreation Area, California, provides an alternative to traditional mark and recapture methods of estimating species population sizes.



Great Smoky Mountains National Park

Volunteers and NPS staff work shoulder-to-shoulder in Great Smoky Mountains National Park electroshocking and removing nonnative rainbow trout from Mannis Branch, a tributary of the Little Tennessee River.

Expedition projects, including lengthy articles in the New York Times, the Los Angeles Times, and the Washington Post, and national network news also covered the story. Canon also financed one million copies of a four-color brochure, "Parks In Jeopardy," designed for park visitors. The brochure explains the complexity of park resource issues and the need for research-based management.

Was the noncommercial image of the National Park Service threatened by the partnership? Not at all. Early and exhaustive discussions among all partners facilitated understanding and compliance with all NPS policies and guidelines. These policies and guidelines are designed to protect the agency's image and to ensure adherence to federal ethical standards. Following them carefully

Counts revealed that 524 rainbow trout were removed from the stream, greatly reducing competition for 105 native Appalachian brook trout subsequently restored to the stream in the pilot project funded by Canon USA.



Great Smoky Mountains National Park

protects the parks while giving corporations an admirable way to express their support of the national parks.

What about fulfilling NPS priorities? “Cause-related marketing,” which comes from a company’s marketing budget, now drives many corporate donations. In cause-related marketing, corporations receive a marketing benefit from association with a good cause, such as the parks. However, to be effective for the company, the donation has to be visible. Therefore, asking a corporation to fund noncharismatic work or a project in a little-known park will always be a challenge.

In *Expedition*, program managers mix and match high- and low-profile parks, complex and accessible projects,

well-known and obscure natural resource issues, and produce packages that please everyone. Canon gets a range of projects, with enough visibility to meet their marketing needs. The National Park Service gets complex, scientifically sound natural resource management projects in large and small parks.

What does this partnership cost the National Park Service? Time. Time spent working with the Foundation and Canon to build an understanding of resource management needs. Time spent telling the public about the desperate problems park natural resource managers face daily. Time spent getting conservation work on the ground.

Time well spent.

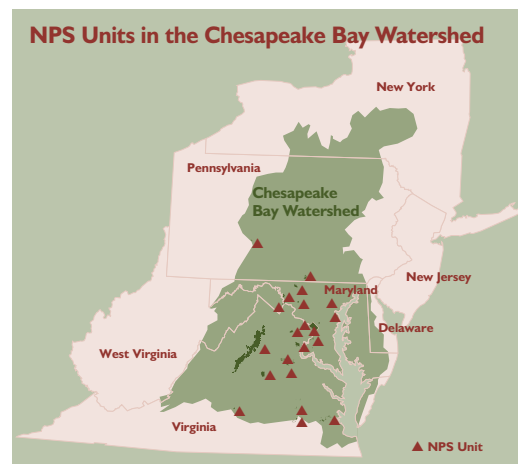
Partnerships and interagency cooperation

The Chesapeake Bay Initiative

by Chuck Rafkind, Kathleen Picarelli,
and Bob Campbell

Largest of all estuaries in the United States, the Chesapeake Bay has been losing its wonderful biodiversity and abundance of life for decades. To aid in its rehabilitation, the National Park Service signed a memorandum of understanding with the Environmental Protection Agency (EPA) in 1993 and became a formal participant in the Chesapeake Bay Program (CBP), a regional partnership at work since 1983 to restore the estuary. Within the watershed of the Chesapeake Bay are 47 units of the national park system, totaling 286,000 acres. In joining the program, we agreed to help restore and protect the bay, both inside and outside park boundaries.

We strengthened our commitment the following year by signing the *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*. This pact formalized the role of federal agencies in the CBP and established policies on nutrient and toxic pollution reduction, habitat restoration, and coordination of research. That year we also published the *NPS Chesapeake Bay Action Agenda*. This document outlined our programs, expertise, and objectives for enhancing the resources in the watershed.



Largest estuary in the United States, the Chesapeake Bay drains a watershed covering six states and containing 47 units of the national park system. It is being preserved through the Chesapeake Bay Program.

Since then, we have participated in interagency team efforts to conduct site assessments of several parks and many other federal installations. The inspections identify hazardous materials and deal with issues related to the sound management of storm water, vegetation, nutrients, and pests.

In February 1996, a National Park Service task force, established the previous year to oversee our involvement in the program, hosted an orientation to the Chesapeake Bay Program. Held during the National Capital Region’s superintendent conference, the orientation sought to define the role parks can play in restoring, protecting, and interpreting the resources of the Chesapeake Bay watershed. As a result, many

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Colonial National Historical Park

College Creek, a wetland habitat of the Chesapeake Bay at Colonial National Historical Park, Virginia.

parks have implemented interpretive and natural resource programs that relate to the Chesapeake Bay. Also, NPS staff are becoming more active in CBP committees, even in these times of austere budgets and staff.

Last September, we reached another milestone in support of the program when our first formal liaison was established at the EPA Chesapeake Bay Program office in Annapolis, Maryland. The liaison represents the Park Service on key committees, coordinates informa-

tion transfer and technical assistance between parks and the program office, and is the principal NPS planner in the Chesapeake Bay watershed.

Partnerships are becoming the backbone of park management. This partnership is an opportunity to improve the stewardship of our lands and restore the resources of the Chesapeake Bay watershed. It also provides a vision of good stewardship and sustainability and is the catalyst for integrating sound management practices into the larger context of the ecosystem.

Regional air quality partnerships

by Erik Hauge

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Regional air quality partnerships are voluntary, ecosystem-oriented, cooperative groups of federal land management agencies and other organizations that have united to deal with air pollution and its impacts on air pollution-sensitive resources in a region. The partners share air quality-related activities such as monitoring, research, regulatory review, and outreach. They develop consensus positions on issues, which allow the partners to speak with a unified voice and have greater clout with air pollution control agencies than they would have individually. They also complement the permit review process established under the Clean Air Act. Permit review focuses on individual (new) sources of air pollution, while the partnerships focus on

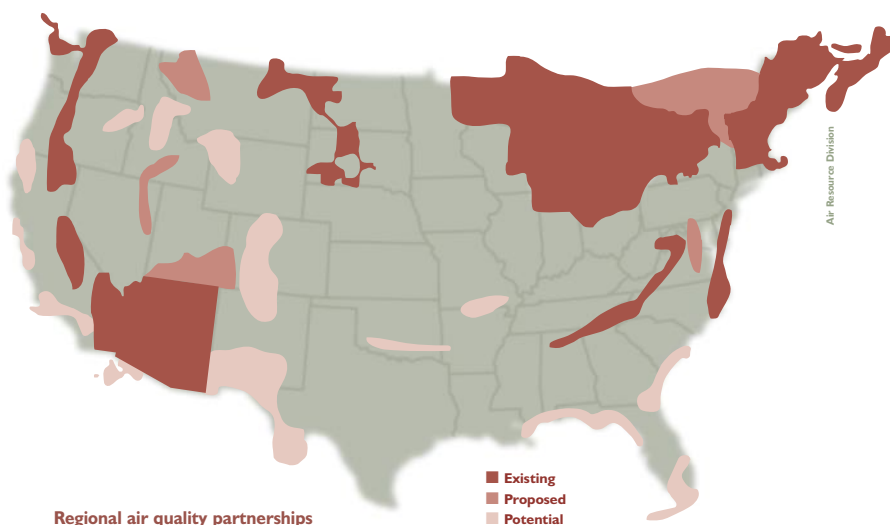
multiple existing sources (the major cause of air pollution on resources).

The first such partnership was organized in 1990 in the Sierra Nevada (Sierra Federal Clean Air Partnership) in California. In 1991, the Park Service and Forest Service established the second partnership in the southern Appalachian Mountains, which has been superseded by the Southern Appalachian Mountains Initiative, a more comprehensive organization. Others have been or are being organized in the Cascades, the northern Great Plains, Arizona (the Arizona Federal and Tribal Clean Air Partnership), and the California-Nevada desert, as well as with Canada in the Atlantic Canada-northern New England region (North-eastern Regional Air Quality Committee) and the Great Lakes. Still others have been proposed in other ecosystems.

Some significant achievements of partnerships include a permanent representative of the Sierra partnership that sits on their regional air quality advisory board. In 1995,

this partnership produced an award-winning videotape and teachers' guide on air pollution in the Sierra, and distributed it to regional schools. In 1996, it published a report summarizing air-quality related activities. A similar report was published in 1996 for the southern Appalachians and was submitted to the Southern Appalachian Mountains Initiative. An air quality assessment for the Northeastern Regional Committee is at press. In 1996, the Arizona Federal and Tribal Clean Air Partnership began to include air-quality related training in its semi-annual membership meetings.

The outlook is excellent. Regional air quality partnerships are productive and will help lead the way toward cleaner air in the parks.



Working with the U.S. Geological Survey Partnership with the USGS

by Lindsay McClelland

The National Park Service and the U.S. Geological Survey (USGS) have a long history of cooperation on a broad range of geological programs. A recent memorandum of understanding has paved the way for the development of new programs, particularly in geologic mapping and public education.

The USGS began new geologic mapping, interpretation, and resource management projects in more than a dozen parks in 1996. Supported through their National Cooperative Geologic Mapping Program, these projects were selected from more than 40 submitted by parks. Numerous additional USGS projects in parks continue as elements of ongoing efforts ranging from coastal erosion studies to geologic hazards monitoring.

Some of the new projects include the following:

1. Ozark National Scenic Riverways, Missouri—

Detailed bedrock and fracture mapping to help assess subsurface water flow feeding the park's world-class springs, and to better characterize serious threats from nearby lead mining

2. Shenandoah National Park, Virginia—

A detailed study of landslides, debris flows, and flooding triggered by a major June 1995 storm to include assessment of the potential for recur-

rence elsewhere in the park. Additional surficial studies will link geology with the effects of acid rain on park ecosystems

3. C&O Canal National Historical Park, Washington,

D.C., Maryland, and West Virginia—A geologic map of the entire 181-mile park length to be used for park planning, public outreach, and the development of exhibits. The severe flooding of 1996 reemphasizes the importance of incorporating geological information into protection of key park resources

4. Grand Canyon National Park, Arizona—An array of

educational products developed with USGS help to illuminate one of the world's most spectacular geological park stories for students and visitors, while geologic mapping continues to expand our knowledge of the nearly 2-billion-year park history

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Geologists at the Geological Survey also continue to make key contributions to the safety of park visitors, staff, facilities, and neighbors with studies of geologic hazards. After the fatal summer 1996 rock fall at Yosemite National Park, California, USGS scientists responded quickly to assess the event and risk of future rock fall, building on years of detailed mapping. At Mt. Rainier National Park, Washington, an interdisciplinary team of USGS geologists and hydrologists are studying potential hazards from future eruptions, glacial outburst floods, debris flows, and possible collapse of unstable portions of this volcano.

Water quality and biological monitoring in parks

by Barry Long

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The National Park Service is engaged in efforts to strengthen its partnership with the USGS National Water-Quality Assessment (NAWQA) Program. During 1996, each agency spent about \$200,000 to pilot park issue-driven, water resource monitoring activities involving nine NAWQA study basins and 11 units of the national park system. Some park issues being addressed include: endocrine system disruption in fish at Lake Mead National Recreation Area, Nevada, urban development at Chattahoochee National Recreation Area, Georgia, and river restoration at Yosemite National Park, California. Additional park projects are planned for 1997; however, expansion of the pilot partnership into a sustainable program depends on future funding.

NAWQA is designed to assess, on a watershed basis, the status and trends in the chemical, physical, and biological quality of the nation's streams, rivers, and aquifers in relation to categories of water uses (e.g., agricultural, industrial). The program also is designed to assess, on a systematic basis, the effectiveness of federal and state water quality management programs, and to develop an improved understanding of the natural and human factors that affect water quality conditions.

While a small number of individual assessments of park water quality have occurred on a project-by-project

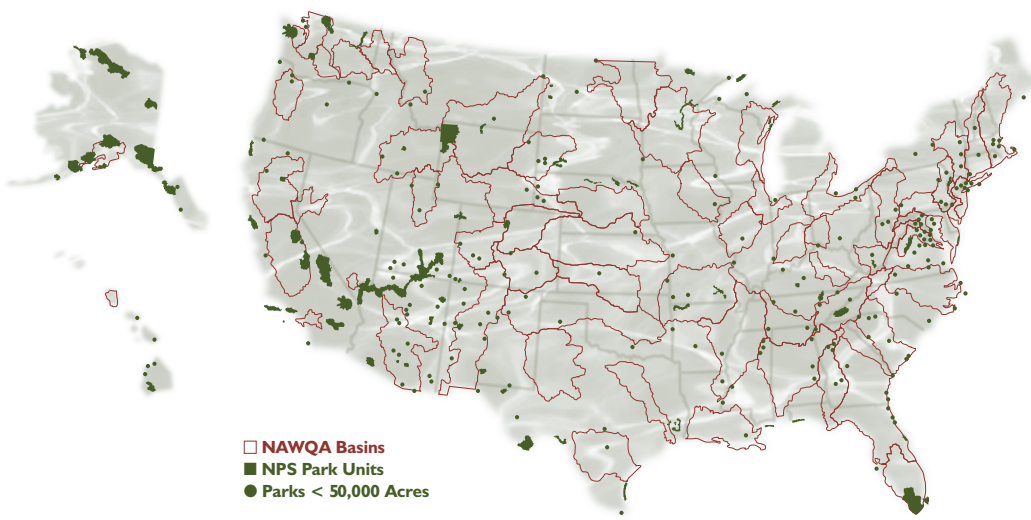
basis, the Park Service has no systematic or sustainable water quality assessment program. In addition, training and staff are inadequate for most parks to conduct and sustain their own water quality technical programs. Furthermore, we lack the organizational infrastructure to support these activities nationwide. The NPS-NAWQA partnership fills this void by providing a sustainable, standardized program of water quality data acquisition in parks that will permit objective, periodic assessments of the status of water quality in parks, and enable us to address our most pressing water quality protection problems. The partnership matches the water quality technical capabilities of the U.S. Geological Survey with the water quality management responsibilities of the National Park Service.

To date, many benefits have resulted from this partnership. For example, St. Croix National Scenic Riverway in Wisconsin is a NAWQA study site that is gaining valuable and credible information very economically. The program has increased the park's visibility in regard to water quality issues and is also flexible, allowing the park to specify sampling sites and parameters needed to address a pressing resource concern. According to Superintendent Anthony Andersen, "we asked for, and received, calcium data to enable us to predict zebra mussel growth conditions. We hope to continue this involvement." Approximately 200 units of the national park system lie in designated NAWQA study basins and stand to benefit from this partnership.



Researchers collect carp at Lake Mead National Recreation Area, Nevada, as part of NAWQA studies to identify synthetic organic compounds and endocrine system disruptors in the fish.

National Park Service Units in National Water-Quality Assessment Study Basins





Columbia-Cascades Support Office

Fort Rock State Monument, Oregon, a national natural landmark.

On being a good neighbor

National Natural Landmarks Program: “on-hold” . . . but holding its own

by Steve Gibbons

Established in 1962, the National Natural Landmarks Program of the National Park Service now includes 587 sites in 48 states, 3 territories, and the Commonwealth of Puerto Rico. In 1996, the program continued to nurture a partnership ethic with the various state, federal, and private landowners. This spirit persists despite a lingering moratorium placed on the program in 1989 that has postponed the nomination, evaluation, and designation of new sites for landmark status. The dissolution of this moratorium hinges on approval of final revised program regulations by the Department of the Interior and Office of Management and Budget.

Even though the moratorium has precluded the addition of new sites to the National Registry of Natural Landmarks, it has provided NPS landmark coordinators across the country with an invaluable opportunity to make strategic improvements to the existing program. Regulations have been revised, all landmark owners have been identified and contacted, the national landmarks database has been updated, and management controls have been established. This inactivity has also given coordinators the time and incentive to become better ambassadors of a new landmark ethic effecting partnerships with many landmark owners.

An iterative tool that has been instrumental in forging better communication with landowners is the annual *Section 8 Report*, required by the 1970

General Authorities Act, as amended. The Section 8 statute directs the Secretary of the Interior to monitor the status and condition of National Natural Landmarks and annually report to Congress on those that are threatened or damaged. Accordingly, program coordinators make annual visits to landmarks to document their conditions and stay in touch with the landmark owners. Through this process we have learned about concerns of the landmark owners and have been able to dispel many of the myths, fears, and misconceptions pertaining to their rights and the National Natural Landmarks Program. In some instances the process has provided the catalyst for cooperative cost-share arrangements in the protection of landmark sites. A prime benefactor of the developing partnership spirit has been the NPS Challenge Cost-Share Program, which has provided the landmarks program a total cost-share amount in excess of \$135,000 in the Columbia-Cascades Cluster alone.

Though in a “holding pattern” for the past eight years, the National Natural Landmarks Program is once again in good hands, and a healthy partnership among the National Park Service and landmark owners has emerged.

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Columbia-Cascades Support Office

The moratorium on listing new national natural landmarks gave the National Park Service time to recognize many landmark owners.



RESTORATION

Some of the most well publicized stories about NPS natural resource management work revolve around efforts to restore plant and animal species or natural processes in parks. While many of these are wonderful success stories, they represent the tip of the iceberg of restoration work that should be done. In most cases, restoration projects are unfunded or inadequately staffed, or information about the status of a threatened or endangered species or natural process is incomplete. Although restoration projects often portray triumphs, they actually represent a failure to either recognize or take action to prevent a potential problem. Today, we realize that we must focus on preventing the decline of species, loss of habitat, and loss of natural processes in the first place. After all, if certain species are in trouble in national parks, what does this tell us about the larger biomes in which we all live?

Wildlife **Yellowstone wolf restoration: an ecological and symbolic milestone**

by Sue Consolo-Murphy

In 1996, Yellowstone National Park continued its efforts to restore a population of endangered gray wolves in the ecosystem. Despite reduced funding, we are on our way to meeting the objective, ahead of schedule and under budget.

Seventeen wolves were captured in 1996 and transplanted from Canada to Yellowstone, held for 10 weeks in acclimation pens, and visited only when fed road-killed ungulates. After release, several thousand visitors were lucky to view wolves chasing and killing elk or interacting with bears during spring. A park ranger and a group of visitors watched a most exciting encounter between two packs, which likely resulted in one young wolf's death. This was not the first fatal encounter between wolves, although human-caused mortalities still outnumber interpack strife as a cause of wolf deaths.

Yellowstone's first fourteen wolves bore two litters totaling nine pups. In 1996, four packs produced 14 pups. By the end of 1996, 11 wolves had died—three

were illegally shot, three were killed by vehicles, two were killed by other wolves, one was removed due to livestock depredation, one was burned in a hot spring, and one died of unknown causes. One pup was accidentally injured and sent to a captive facility. Despite these losses, 40 wolves freely roamed the greater Yellowstone area. In addition, 10 young wolves brought from northwestern Montana will be released in early 1997, a year when as many as eight packs could have pups. The original plan to transplant wolves for three to five years was terminated, due to reduced funding but also due to the unexpected reproductive success of the wolves. Furthermore, although lone wolves roam widely, conflicts have been low, resulting in less than two dozen sheep and no cattle lost of 412,000 livestock that graze the ecosystem. The goal to restore wolves and begin delisting them by approximately 2002 appears within reach.

The program's visibility has resulted in opportunities to educate audiences about predator-prey relationships, endangered species restoration, and the importance of maintaining intact ecosystems. The program also has tremendous support from private groups and individuals who have generously donated their time and money; about one-third of the program is privately funded. Such partnerships are critical in this era of austere budgets and downsizing.

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Gray Wolf (*Canis lupus*).

The return of the only species known to be missing from the world's first national park for the past half-century is a milestone in ecological restoration. It not only restores the wildlife complement of greater Yellowstone, but also is a symbolic victory for conservationists who patiently and persistently reversed the once-dominant attitude against predators to one of acceptance. Aldo Leopold would be proud that many humans have come to respect even these "killer creatures" with whom we share the Earth. We must capitalize on this public support to continue restoring other missing species and, more importantly, prevent further endangerment of species and their habitat.



Yellowstone National Park

This wolf pup, one of the first born in Yellowstone National Park in more than half a century, is creating history as it reclaims its rightful heritage.

Ferrets recovering at Badlands

by Bruce Bessken and Glenn Plumb

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Escape from predators is not as easy for prairie dogs in Badlands National Park these days; they may also need a little luck. Recent restorations of the black-footed ferret (*Mustela nigripes*) in the South Dakota park have brought this highly specialized predator of the prairie dog back from the brink of extinction. Through the fall of 1996, biologists had released 134 young-of-the-year and 36 adult captive-bred black-footed ferrets into the Conata Basin-Badlands prairie dog complex contiguous with both the park and Buffalo Gap National Grassland.

Ferrets are very closely linked to the prairie dog for food, shelter, and habitat. Since the early 1900s prairie dog range is estimated to have declined as much as 98% due to poisoning, disease, and changes in land uses. The sum of these impacts brought about extinction of the ferret in the wild by 1987, when the last of the known 18 remaining individuals were collected for captive breeding. Between 1988 and 1993, interagency collaboration and public support, in the face of considerable opposition from agricultural interests, led to the decision to initiate experimental ferret recovery on federal lands in southwestern South Dakota.

In 1994, biologists began a five-year interagency effort to restore the ferret. A partnership between the

National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, and the South Dakota Game, Fish, and Parks Department provides dedicated personnel and funds to reintroduce the animals and monitor their populations. Using radio telemetry and visual searches for the nocturnal ferret, biologists learned in 1996 that given limited intervention, approximately 40% of the introduced animals survive transition to the wild. More importantly, population renewal is under way as wild-born litters have been found each summer since the project was initiated. Conclusive evidence shows that all possible female classes (i.e., those released in 1994 and 1995, and those born in the wild in 1995) reared litters in 1996.

Pending continuing releases through 1998 and sustained recruitment, population models suggest a minimum viable population could be established by the turn of the century. A long-term commitment to monitoring and managing this showcase population, not yet secured, is needed to guarantee the contribution it could make to the national recovery program as a donor population for additional reintroductions. Conservation biologists expect this experimental program to illuminate the conservation potential for prairie dog ecosystems, which provide habitat for over 140 Great Plains vertebrates. The black-footed ferret recovery program has already proven a strong stimulus to vocal constituencies for this broader conservation context.



Badlands National Park, Black-footed Ferret Recovery Program

Black-footed ferret

Paying for restoration The native plant conservation initiative

by Margaret Sotham

Where plant conservation is concerned, collaborative partnerships with federal and nonfederal entities are essential to achieving the National Park Service mission. Comprising more than 50% of the endangered species list, plants receive less than 3% of federal restoration funding. In 1995, the Park Service spent \$2.6 million on endangered species, but only \$116,000 on plants—less than 4%.

In 1994, the National Park Service joined in a memorandum of understanding with the U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service, Agricultural Research Service, Natural Resources Conservation Service, U.S. Geological Survey, Department of Defense, and Office of Surface Mining Reclamation and Restoration to work cooperatively on native plant conservation. This effort created the Federal Native Plant Conservation Committee, which in turn laid the foundation for the Native Plant Conservation Initiative, a partnership between these federal agencies and nearly 60 nonfederal cooperators.

Under the initiative, federal and nonfederal entities work cooperatively to complete on-the-ground conservation projects. Through a grant program administered by the National Fish and Wildlife Foundation, the initiative has underwritten 37 grants totaling nearly \$800,000 in federal and nonfederal matching funds for projects on public and private lands in 26 states. One of these was awarded to the Grand Canyon Habitat Restoration Program in 1996 for a park visitor-volunteer effort to battle exotics. The volunteers removed nine exotic species totaling nearly 10,000 plants and replaced them with natives. They have also established a monitoring program to detect any further infestations of these alien plants. In 1997, \$275,000 will be administered through this grant. Despite these efforts, many native plant conservation needs remain unmet. In 1996, only 27 of the 126 grant proposals submitted were funded by the initiative. In 1997, more than 100 proposals requesting \$1.2 million are under consideration.

Some of the initiative's greatest success has been in raising awareness of plant conservation issues throughout

its member agencies and with the public. Two working groups, one for restoration and one for invasive exotics, educate and train federal, state, and private groups in dealing with these conservation issues. Taking its message to the public, the initiative has created an ongoing outreach program that includes a homepage on the World Wide Web, the "Celebrating Wildflowers" public awareness campaign, a traveling exhibit on native plants, television public service announcements distributed in cooperation with the Garden Club of America, and printing and distribution of the new *Wild Wealth* brochure detailing the importance of native plants in our everyday lives. A newsletter and accomplishments report are currently in development. Under a new partnership between American Express and the National Park Foundation, prepaid phone cards feature native plant images and scenes from national parks. Retail sales and promotional use of the native plant cards benefit the initiative.

These projects represent the vital first phase in conserving the nation's plant resources. They are small but pivotal steps toward the larger strides needed if we are to preserve our most important asset—biodiversity.

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Volunteers repot native plants in preparation for transplanting as part of the Grand Canyon Habitat Restoration Program.

Nine exotic species were first removed, totaling nearly 10,000 plants, then replaced with natives, such as cacti. A monitoring program will look for further infestations of alien plants.



Restoring ecosystem processes Experimental flood builds habitat in Grand Canyon

by Bill Jackson

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Like wildfires, floods have long been viewed as natural disasters. Yet, just as fire rejuvenates forest and rangeland ecosystems, flooding disturbs stream channels and reinvigorates riparian resources. Such was the thinking behind an experimental flood in the Colorado River in 1996 that was designed to redistribute sand in Glen Canyon National Recreation Area and Grand Canyon National Park and provide the river with an ecological fresh start.

Ever since the Glen Canyon Dam began regulating the Colorado River in 1965, both Glen and Grand canyons have been deprived of annual snowmelt floods each spring. This imparted an unnatural “stability” to downstream aquatic and riparian ecosystems, many of which exist on a “foundation” of sand in the river and along its edge. Before

the dam, this sand foundation deposited and eroded on an annual basis. The controlled, habitat-building flood was billed as an experiment in sediment redistribution and was released from Glen Canyon Dam for one week in late March 1996. Its primary purpose was to determine if and how sediments stored on the bed of the Colorado River could be relocated to the margins of the river to recreate the sandbars and associated aquatic and riparian habitats, which had been lost to progressive erosion since closure of the dam.

The 45,000 cubic-feet-per-second water release, which is slightly more than half the pre-dam average annual flood peak, was proposed as part of the preferred alternative in the environmental impact statement on the operation of Glen Canyon Dam. A large, multi-agency monitoring and research program supported by the Bureau of Reclamation was conducted in conjunction with the release and conclusions are still pending. However, preliminary results suggest that the flood was successful in rebuilding sandbars and aquatic habitats. Nonetheless, the effects of the flood on sandbar dynamics were complex. While the vast majority of sandbars in the sand supply-limited reach above the confluence of the Little Colorado River increased dramatically in size, sandbars in the sand-rich reach downstream from the Little Colorado demonstrated a more variable response, with some deposits enlarging and others eroding. The flood had an overall beneficial effect on sandbar deposits, and little, if any, adverse impacts to sensitive resources such as endangered fish, trout, aquatic food bases, or cultural resources occurred.

Implementation of the experimental flood was controversial. Upper basin states and hydropower interests opposed the release until criteria were agreed upon in the *Colorado River Annual Operating Plan*, which constrains the future use of flood releases as a management tool. Some controversy still surrounds the long-term use of flooding for management, but the 1996 experimental flood will provide a scientific basis for prescribing future high-flow releases to benefit downstream natural, cultural, and recreational resources. Additionally, the high degree of public interest in the event improved the general understanding of floods as a natural ecosystem process. Although the flood was important for both Glen and Grand canyons, it is also significant for the overall management of regulated rivers.

Water gushes out of
Glen Canyon Dam, Arizona, in
a dramatic experiment to test the
ability of a controlled flood to
redistribute silt and build sandbars
downstream in Grand Canyon.

Ever since 1965 when the
dam began operating, the Colorado
River has progressively lost terrestrial
habitat to erosion. The experimental
flood gave the river an ecological fresh
start and had an overall beneficial
effect on sandbar deposits.



Water Resources Division



Bill Jackson

Un-plumbing the Everglades

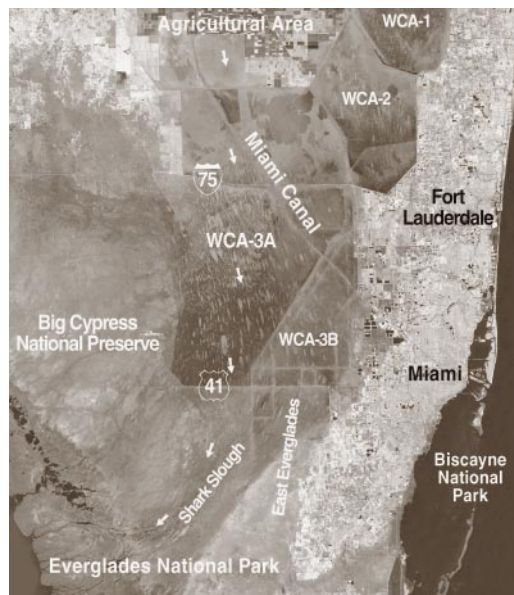
by Robert Johnson

Progress in restoring water quality and ecologically functional water flow at Everglades National Park comes slowly and the process is expensive and complex. However, throughout 1996 various pieces of legislation and cooperative planning efforts have emerged as tools that are facilitating the eventual restoration of this immense natural system.

The Everglades ecosystem represents the southern portion of the greater Kissimmee-Lake Okeechobee-Everglades watershed that once covered more than 8.9 million acres in South Florida. The Everglades portion of this watershed was an expansive shallow-water marsh, characterized by uninterrupted surface water *sheetflow*, gradual changes in seasonal water levels, and persistent freshwater flows into the downstream estuaries. The unique combination of South Florida hydrology and biogeography has produced a complex mosaic of temperate and tropical plant and animal communities. Over the past 100 years this complex system of uplands, wetlands, and coastal habitats has been modified to accommodate expanding agricultural and urban development. Today this region is home to over six million residents and supports a thriving tourism industry and agricultural economy that impact the fragile South Florida ecosystem.

Land and water management alterations of the Everglades over the past 100 years have resulted in profound changes to the natural water flow and water quality of the system, with associated detrimental impacts to its ecological structure and function. The most significant changes occurred as a result of construction of the Central and Southern Florida Flood Control Project beginning in 1948. Today this is one of the largest plumbing projects in the world, comprising more than 1,200 miles of levees and canals, over 150 water control structures, and 16 major pumping stations. As this project resolved most of the major water supply and flood control problems in South Florida, a second set of equally critical environmental problems emerged. Today there is wide acceptance that the ecological integrity of the Everglades is nearing collapse, which will have major ramifications for the human population and economy of the region.

In response to these concerns, in 1992 Congress directed the Army Corps of Engineers to initiate a com-



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This satellite image of South Florida reveals both natural water flow patterns (arrows) through Big Cypress National Preserve and Everglades National Park and much of the development responsible for water diversions.

prehensive review of the Central and Southern Florida Flood Control Project, with a focus on restoring and enhancing the region's natural systems while maintaining other authorized project purposes. In 1993, the Department of the Interior established an interagency task force, which is currently made up of 22 federal, state, tribal, and local government agencies, to coordinate ongoing and future restoration efforts. In 1994, the Governor of Florida established the Governor's Commission for a Sustainable South Florida to develop recommendations and foster public support for restoring the South Florida ecosystem, while maintaining a sustainable economy and quality communities.

These efforts have converged to form the framework of a comprehensive plan for South Florida ecosystem restoration. The plan includes: (1) the development of an innovative federal, state, and private sector cost-sharing partnership (the 1994 Everglades Forever Act) for environmental and water quality improvements, (2) new federal legislation (the Water Resources Development Act of 1996) to authorize and guide the Army Corps restoration efforts, (3) funding for accelerated land acquisition (the Farm Bill of 1996) to purchase and protect key parcels of land not presently in public ownership, and (4) increased scientific research with an emphasis on adaptive environmental management (the 1997 Department of the Interior South Florida Science Initiative). The target year for restoration efforts to begin is 2006, and the task is expected to cost \$250 million. Continued research and planning are needed now to help achieve this goal.

Dam removal awaited at Olympic

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Olympic National Park,
Washington.

Built on the Olympic Peninsula in Washington in the early 1900s, the Elwha and Glines Canyon dams block access of anadromous fish such as salmon and steelhead to over 70 miles of stream habitat, 95% of which lies within Olympic National Park. At the same time, the dams provide only one-third of the power needs for a single pulp mill in nearby Port Angeles. Remaining fish populations are limited to the lowest five miles of stream and are a fraction of their historic sizes. The federal licensing process for the two nonfederal dams began in 1968 and was extremely contentious; to resolve the licensing issue, Congress enacted the Elwha River Ecosystem and Fisheries Restoration Act (P.L. 102-495) in 1992.

Pursuant to the Elwha Act, the Secretary of the Interior has determined that both dams must be removed to meet the goal of the act, which is full

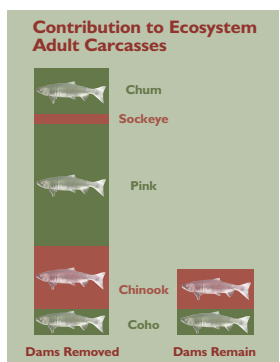


Two hydroelectric dams were constructed in and near Olympic National Park earlier this century. They block salmon and trout passage to more than 70 miles of the Elwha River and its tributaries.

restoration of the Elwha River ecosystem and native anadromous fisheries. Dam retention with fish passage facilities would partially restore only three of the 10 salmon and steelhead stocks that historically inhabited the watershed, or about 48,000 adult fish. Dam removal would restore all 10 stocks, representing over 390,000 adult fish. The Elwha Act is supported by all parties to the licensing process, including the owner of the dams and the National Park Service, and existing and pending litigation has been stayed pending removal of the dams.

In 1996, the National Park Service completed the last of two environmental impact statements related to the proposed restoration efforts. The preferred alternative is the removal of both dams and naturally eroding sediments downstream that have accumulated in the reservoirs, restoration of the fisheries, and revegetation. The estimated cost for the project is \$113 million, including dam acquisition at \$29.5 million, water quality protection, and flood control. However, the project will return \$163 million through direct jobs and increased fish harvest, and support industries in a county hard hit by reduced timber harvests.

Removal of the Elwha and Glines Canyon dams represents the single best opportunity to restore large numbers of salmon in the Pacific Northwest. Salmon stocks will continue to decline to extinction if action is not taken quickly to implement this decision. While federal, state, and tribal entities are taking emergency actions to maintain the existing runs, reversal of the salmon declines and ecosystem degradation awaits the necessary congressional funding.



Without salmon and trout to add substantially to the biomass of the ecosystem, wildlife populations are suspected to have declined in Olympic National Park. Restoration of the fishery would bolster ecosystem productivity.

Removal of the Glines Canyon Dam and its companion downstream is the preferred alternative to restore the Elwha River ecosystem and native anadromous fisheries. The project is expected to cost \$113 million and awaits funding.



Clearing the air on the Colorado Plateau

by Joe Carriero and Brian Mitchell

The massive landforms, unusual geology, and vivid colors in Grand Canyon, Zion, Canyonlands, and other national parks on the Colorado Plateau provide some of the world's most spectacular scenery. Unfortunately, these wonders are sometimes shrouded by haze and fade from view. Air pollution impairs visibility and obscures the vistas that make the Colorado Plateau special. And unless positive steps are taken, the visibility there could deteriorate even more as a result of the continued economic growth projected for the region.

One step in the right direction may be the 70-point plan, *Recommendations for Improving Western Vistas*, unveiled in 1996 by the Grand Canyon Visibility Transport Commission. Required by the 1990 Clean Air Act amendments, the commission was formed by the Environmental Protection Agency in 1991 to assess the causes of poor visibility in those Colorado Plateau parks and wilderness areas given special protection under the act. The commission was charged with recommending potential solutions to the EPA.

Among the key recommendations outlined in the plan is the development of policies or programs that promote energy conservation and require the use of renewable resources for energy production. Other key recommendations would cut auto emissions, decrease sulfur dioxide emissions from industrial facilities, set limits on prescribed burning, and track increases in emissions that would affect air quality in clean air corridors.

National Park Service air quality experts and resource managers made significant contributions to the work of the commission. They joined commission members from other federal and local government agencies; the governors of eight western states; and representatives from industry, environmental groups, academia, community organizations, tribes, and the public.

The size of the commission and the diverse interests of the membership made decision making difficult at times. Nevertheless, the process was a good example of ecosystem management in action. The members of

the various committees persevered, and the commission developed a plan that could be a turning point for air quality efforts in the West.

The Environmental Protection Agency now has until mid-1998 to evaluate the commission's recommendations and take action. In the interim, however, the commission is not standing still. The Western Governors' Association recently proposed formation of a policy organization "to initiate and coordinate activities associated with implementing the commission's recommendations." It also proposed that a second group be formed to coordinate science and technology issues related to the commission's recommendations.

Interior Secretary Babbitt praised the work of the commission, calling its plan "real progress toward the national visibility goal." Babbitt said, "the commission's recommendations will begin a new era; one that ensures my grandchildren will see these spectacular places as clearly and find them as inspirational as I did."

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This computer-enhanced photograph shows two visibility conditions at Grand Canyon National park. The right half depicts visibility on a good day. However, on five percent of days, visibility is as bad as or worse than that depicted on the left.





LEGISLATION, POLICY, & LEGAL CHALLENGES

The legal and policy arenas have direct implications for sound management of natural resources in parks. Although the National Park Service has clear legal mandates, policies, and guidelines related to natural resource preservation, our ability to carry them out effectively also relates to timing and the political environment. Important park protection issues arose in 1996. How these issues played out in the legal and policy arenas often hinged on resource managers being effective advocates of National Park Service statutes, regulations, and policies coupled with sound scientific data. The most visible case was the buyout of the proposed New World Mine adjacent to Yellowstone National Park. National Park Service concern over resource impacts and the efficacy of mitigation measures compelled President Clinton to pursue a buyout deal with the owners of the mine to protect the park.

Deal making **New World Mine: policy and politics collide**

by Kerry Moss

Last August, the National Park Service was the beneficiary of one of the most significant natural resource protection decisions of the Clinton Administration. The President publicly announced in Yellowstone National Park, Montana, that the federal government had reached agreement with Crown Butte Mining, Inc., to stop construction of the proposed New World Mine.

The controversy began in 1990 when Crown Butte applied to the State of Montana for a hardrock mining permit that proposed the New World Mine—a 1,200 ton per day, underground gold, silver, and copper mine. Mine life would be 12–20 years and facilities would include a work camp, mill, and a 77-acre tailings impoundment for storage of 5.5 million tons of acid-generating tailings.

Citing numerous resource concerns, including surface and subsurface water quality, wetlands and wildlife

impacts, and seismic instability, the National Park Service participated heavily in the permit review process. Staff from the park and the NPS Geologic, Water, and Air Resources divisions worked with other federal, state, and private entities in reviewing the 2,000-page permit application. Despite our stringent protests, Montana declared the application complete in 1993, and the environmental impact statement (EIS) process began immediately. The Montana Department of Environmental Quality and the Gallatin National Forest were designated lead agencies for the EIS process, and the National Park Service served a cooperating agency role.

The process to identify impacts proceeded slowly, and the National Park Service maintained that the lead agencies were not adequately analyzing impacts and long-term risks associated with mining the high sulfide (acid producing) ore bodies of the New World Mining District. In their frustration over the time consuming, embattled EIS, Crown Butte officials and their lobbyist, ex-Senator Birch Bayh, took their quest for mine approval to the press. The company consistently downplayed possible impacts to Yellowstone and chided the National Park Service for acting as the lightning

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President Clinton announces the land-swap deal at Yellowstone.



Geologic Resource Division, Dave Steensen

After reviewing scientific data on the risks posed by the New World Mine, a delegation from the World Heritage Commission assembled near the mine and placed Yellowstone on its list of world heritage sites “in danger.”

rod for environmental concerns that were slowing the EIS process. Company officials even visited the office of NPS Director Kennedy on more than one occasion. The “trial” of the proposed mine in the press escalated as the war of words spread from the company, to the lead agencies, to local environmental coalitions, and even to the Park Service. Press coverage went national, eventually resulting in four Pulitzer prize winning editorials in the New York Times supporting resource protection.

What had started as a very localized battle to protect the northeast corner of Yellowstone from the hazards of large-scale mining in a high altitude, sensitive environment, took on national and worldwide significance. In 1995, a delegation from the World Heritage Commission visited the park to investigate the proposed mine. Yellowstone was designated a world heritage site in 1978, whereby the United States committed to use its existing laws to protect park resources for all people. The science and risk data

presented by the Park Service and our partners convinced the commission to place Yellowstone on the list of world heritage sites “in danger.” This listing, combined with national press coverage, played a key role in escalating the issue.

A nearly six-year battle to protect park resources from the potential harm of mining was won with a stroke of the President’s pen. The government agreed to negotiate with Crown Butte the details of acquiring their properties and interests in the New World Mining District over the next 18 months. The all-important task of predicting environmental impacts through the EIS process was circumvented by politics and world opinion. Complaints about public and political pressure brought to bear on the permit applicant still resonate, particularly from the mining industry. However, the end result of this entire issue can best be summed up by a quote from President Clinton in his speech from a park meadow when he said, “Yellowstone is more precious than gold.”

Legislation International site designations and the American Land Sovereignty Protection Bill

by John Dennis

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During 1995 and 1996, a widely scattered impression took hold that the federal government was giving the United Nations sovereignty over lands in the United States, particularly federal lands in the national park system. This impression arose from misinterpretation of informational signs in a number of national parks that identify those areas as world heritage sites or as members of the international network of biosphere reserves. This perception generated a volume of factually incorrect newspaper and other media articles, letters to the editor, and communications to Congressional representatives. In response, House Resources Committee Chairman Don Young introduced HR3752, a bill to preserve the sovereignty of the United States over public lands and acquired lands owned by the United States, and to preserve state sovereignty and private

property rights in nonfederal lands surrounding those public and acquired lands. The public concern that led to introduction of this bill reveals a significant lack of understanding of the nature of the relationship between U.S. properties and international site recognitions.

A decision by the United States to request international recognition of the significant values of a site under its jurisdiction and designation of that site as a biosphere reserve or world heritage site is voluntary. Such sites designated in the United States do not undergo any change in legal status—existing private property rights remain intact, local land use and zoning rules continue, state laws and regulations persist, and federal laws and rules still pertain. In the case of its world heritage sites, by signing and ratifying the World Heritage Treaty, the United States accepted the obligation to respect the integrity of all sites that it voluntarily nominates and the World Heritage Committee subsequently designates. The United States exercises this treaty obligation by applying its own existing local, state, and federal laws and regulations, not by yielding sovereignty and becoming subject to United Nations laws or regulations.

Neither of these designations places U.S. properties in any kind of a United Nations land use program, nor do these designations create United Nations reserves in the United States. Administration testimony at the September 12, 1996, Congressional hearing on the proposed legislation pointed out that the United Nations does not have any authority to affect federal land management decisions within the United States. This testimony also stated that international agreements have not been used to exclude Congress from land management decisions, nor do they have the ability to do so.

The original intent of the proposed legislation—developing a more meaningful role for Congress in the domestic part of both programs—is very supportive of efforts in the United States to fully benefit from the resource conservation aspects of both programs. This intent also is supportive of the cooperative approach to

sustainable development that is key to the Man and the Biosphere Program, and especially to the biosphere reserve concept. These two programs provide opportunities for the United States. One is to contribute internationally to the conservation and sustainable use of world-renowned natural and cultural resources. A second is to receive local economic benefits from the international tourists who come to the United States to visit its internationally recognized sites. A third is the local sustainable development and resource conservation benefit that derives from the increased cooperation that occurs locally when federal, state, and local agencies, private organizations, and private citizens voluntarily join together in biosphere reserve partnerships. The proposed legislation as redrafted and resubmitted (HR901) early in 1997 does not explicitly consider these beneficial opportunities that the international recognition programs offer to the United States.

New Parks Legislation

Passed last November, the Omnibus Parks and Public Land Management Act authorized two new additions to the national park system: Tallgrass Prairie National Preserve, Kansas, and Boston Harbor Islands National Recreation Area, Massachusetts.

Operating on a shoestring

by Mary Martin

After years of debate, Congress passed the California Desert Protection Act in October 1994, and the National Park Service inherited a new jewel, Mojave National Preserve. Rich in cultural resources, this 1.4-million acre park is also home to the threatened desert tortoise, the endangered Mojave Tui chub, relict stands of white fir, and the largest and densest Joshua tree forest in the world.

Nine permanent employees comprised the original staff and came together in early 1995. Initially, they met almost every challenge they undertook. Then came news that the Department of the Interior appropriations bill emerged from conference committee in September with a \$1 budget for park operations in fiscal year 1996. The possibility of a veto seemed unlikely and the future looked bleak. Over the next several months, four staff members transferred and uncertainty ran high. The impact the staff felt, family members included, was devastating.

Timing could not have been worse when the mandatory federal furloughs hit in November and

December 1995. While most NPS employees were concerned about the furloughs, the staff was faced with losing their jobs along with the newest unit of the park system. In spite of everything, they knew they had to pull together and proudly carry out their mission.

So, how did this park protect its resources and operate on a proposed \$1 budget? It came down to staff dedication. In late 1995 and throughout 1996, they organized an advisory commission; began planning the removal of a transcontinental communications cable while protecting the desert tortoise; incorporated research from two park science centers into

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More than just a dump for old junk, Mojave National Preserve is a diverse desert land where the Mojave, Great Basin, and Sonoran deserts all converge.



Mojave National Preserve

operations; dealt with an illegal mining operation and wilderness and rights-of-way issues; repaired facilities and responded to visitor emergencies; and brought in volunteers and established a fee program. They also asked for park planning and operations support from Death Valley National Park, Lake Mead National Recreation Area, the Pacific-Great Basin Support Office, and the Geologic Resources Division, who shared their resources generously.

Through these efforts, in 1996 the park removed exotic species (tamarisk) from springs; inventoried the burro population (one of the most significant natural resource management issues); developed a grazing permit program (1.1 million acres are managed under

grazing permits); began a mining program (more mines exist in the preserve than in all of the rest of the national park system combined); accomplished a myriad of maintenance projects including repair of water systems and road grading; and successfully prosecuted and exacted financial and criminal penalties for one of the most significant environmental crimes (hazardous materials dumping) in National Park Service history.

What a difference half a year can make. By April 1996, the park received its actual budget of \$812,000 and has seen an increase for fiscal year 1997 to \$1.9 million. With these funds, the park is busy building a first-class organization, which will include a natural resource management staff.

Legal challenges **Bison in greater Yellowstone: symbol and scourge?**

by Sue Consolo-Murphy

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Each winter, bison often leave the park near the Roosevelt Arch at Yellowstone's northern border in search of winter range; many are either shot or captured for slaughter.

Brucellosis, a disease causing fetal abortions in cattle, is carried by some of the freeranging bison in Yellowstone National Park. For more than a decade, scientists, local citizens, and veterinarians have debated the risk posed when bison cross park boundaries onto lands grazed by cattle. After years of controversial bison removals while managers tried unsuccessfully to develop an acceptable interagency bison

management plan, the State of Montana sued the federal government to speed resolution of the issue.

While under NPS policy of managing for natural processes Yellowstone bison herds have grown in size, apparently unaffected by the disease, a separate goal of the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS) has been to eradicate brucellosis. Somewhere in between are park neighbors: the U.S. Forest Service, custodians of multiple land uses, including permitted livestock grazing; the Montana Department of Fish, Wildlife, and Parks, managers of *game*—which by state definition does *not* include bison but does include the very huntable elk, who also carry brucellosis; the Montana Department of Livestock, who in 1996 attained lead responsibility over the control of bison leaving Yellowstone; and private ranchers concerned about the potential loss of their ability to sell cattle if Montana loses its APHIS-designated “brucellosis-free” status. Environmental groups and some researchers point out the lack of demonstrated brucellosis transmission from wild bison to cattle, and note the double standard in assessing risk of disease from the more abundant and widespread elk.

Despite the growing movement toward ecosystem management, an invisible fence exists in the minds of many who view Yellowstone as a mismanaged landscape due to our failure to control the bison and their diseases within the park. Continued debate about this



Yellowstone National Park

issue has prompted renewed scrutiny and a governmental audit of Yellowstone's management of large ungulates. Ten years after Congress requested an investigation into "whether Yellowstone's northern range was overgrazed," a compilation of scientific reports was finally completed, and a renewed round of public discourse on Yellowstone and NPS natural resource policies has begun.

Yellowstone is lauded as the place that saved wild American bison from extinction early in this century. It is also a focal point for discussions about how much (or how little) influence humans should exert in managing wildlife in wildlands. While the absence of specific goals for animal numbers and vegetative conditions are peren-

nially lamented by critics of NPS policy, many scientists and conservationists value the emphasis on natural processes and see this large, relatively pristine landscape as a place for invaluable learning and appreciation. Park managers continue to seek some consensus among the conflicting social, economic, and political views, and hope to keep bison management from being legislated or adjudicated for expediency.

At the end of 1996, interim plans called for using various methods along park boundaries to maintain separation of bison and cattle. In December, the shooting or capture and slaughter of bison carrying brucellosis had begun, with signs of it being another long winter.

Court upholds NPS ability to regulate private oil and gas development

by Carol McCoy

In 1996, National Park Service staff assisted Department of Justice attorneys in holding the line against a pending appeal to overturn a federal district court ruling favorable to park protection. The ruling specifically upheld the legality of NPS authority to regulate private oil and gas development at Padre Island National Seashore in Texas. It also set a positive legal precedent for the ability of park resource managers to protect parks from adverse activities on private property throughout the national park system.

The lawsuit commenced in March 1994 when the owners of the subsurface oil and gas rights at Padre Island filed a complaint in federal district court to prevent park resource managers from protecting park resources from private oil and gas development within park boundaries. The owners structured their complaint in two parts. First, they argued that the National Park Service lacked legal authority to regulate private oil and gas activities. If the court disagreed, then the plaintiffs argued that NPS use of that authority constituted a takings and they sought \$750 million as compensation. Because of the magnitude of the money involved, the court lacked jurisdiction to deliberate on this aspect of the complaint.

While we were confident of NPS authority to regulate private oil and gas activities in the park and the reasonable use of that authority, we took the suit very seriously. This was the first time a lawsuit challenged the legal basis of the NPS nonfederal oil and gas regulations at 36 CFR Part 9, Subpart B. An adverse ruling would have sent shock waves through the resource management programs at Padre Island and the 12 other park units contending with private oil and gas development. It also could have adversely affected our ability to protect parks from nonmining related uses on private property within park boundaries. Finally, an adverse ruling would have significantly emboldened

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Wading birds such as herons, egrets, and ibises are among the species protected at Padre Island National Seashore.



Geologic Resources Division

other private oil and gas owners in parks to pursue their own takings challenges against the National Park Service.

We quickly assembled a team consisting of staff from the park, the region, and the Geologic Resources Division to assist the Department of Justice with the government's defense. We compiled an exhaustive legal and technical record that supported NPS regulatory authority and sound application of the regulations at Padre Island and the other parks with nonfederally owned oil and gas. Armed with this record, the Department of Justice attorneys prevailed in federal district court. Now they must prevail at the appellate level.

While no decision has yet been rendered by the United States Court of Appeals, a reversal is unlikely. The owners also are still considering pursuing their takings claim in the appropriate federal court. Such a claim must establish that the National Park Service was unreasonable in placing resource mitigation requirements on specific operations at the park. Neither the Justice Department attorneys nor the NPS team believes the administrative record supports such a finding. Rather, the record demonstrates that park resource managers have tightly fashioned mitigation measures to protect at-risk park resources, a critical defense to any takings challenge.

Policy and regulations Progress toward natural quiet

By Rick Ernenwein and Wes Henry

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Hikers in Grand Canyon and Rocky Mountain national parks now have a better chance of experiencing the natural quiet without the intrusion of aircraft noise. Following many years of research, discussions, interagency negotiations, and national media attention, on April 22, 1996, President Clinton directed the Secretary of Transportation in consultation with the Secretary of the Interior to:

1. issue regulations that place appropriate limits on sightseeing aircraft over Grand Canyon National

Park to reduce noise immediately and make further substantial progress toward restoration of natural quiet,

2. propose regulations to address the potential adverse impacts of sightseeing overflights on Rocky Mountain National Park,
3. propose regulations for managing sightseeing aircraft in those national parks where it is deemed necessary to reduce or prevent the adverse effects of such aircraft,
4. develop appropriate educational and other materials for the public and all aviation interests that describe the importance of natural quiet to park visitors and the need for cooperation from the aviation community.

This diagram shows
NPS computer model predictions
of the percentage of the time that air-
craft are expected to be noticeable
under current conditions at Grand
Canyon National Park.



The President's directive led to Federal Aviation Administration (FAA) regulations for Grand Canyon and Rocky Mountain national parks. In Grand Canyon, the rule placed a cap on the number of tour aircraft and a curfew on overflights, and will lead to a complex modification of existing airspace structure. New air tour routes and a phase-out of noisier aircraft have been proposed, providing incentives for the use of quieter aircraft. In Rocky Mountain National Park, the rule temporarily banned sightseeing tour overflights.

Part of this success stems from interagency consultations. During 1996, the National Park Service successfully defended and advanced its aircraft management recommendations, definitions of "natural quiet" and "substantial restoration," and research (summarized in its 1994 report to Congress). Our assertions were intensely scrutinized by the public, scientific community, and other agencies, but prevailed, and

an interagency work group helped resolve disputes between agencies.

Technical advances are also helping. Despite the lack of any full-time NPS staff devoted to overflight issues nationwide, a core team from the Washington Office, Intermountain Region, and Grand Canyon performed extensive computer modeling of aircraft noise for Grand Canyon air tour scenarios with GIS-based software developed under NPS contract. Out of necessity, we also worked with a contractor to develop a special monitoring system that can measure the extreme quiet found in many parks.

The FAA rules for the two western parks represent progress in protecting resources and the visitor experience from the adverse effects of aircraft overflights. However, over 100 national park system areas reported aircraft overflight concerns in 1996. In 1997, the NPS and FAA will develop the national rule and educational materials required by the President's directive.



Efforts to protect Cumberland Gap from coal mining hit pay dirt

by Carol McCoy

Park and Natural Resource Program Center staff scored a victory on September 17, 1996, when Secretary Babbitt announced the decision of the Department of the Interior (DOI) to protect Cumberland Gap National Historical Park and its surrounding watershed from adjacent surface coal mining in Tennessee. For over two years, NPS staff had been underscoring the importance of using provisions in the Surface Mining Control and Reclamation Act of 1977 to protect the park. Our efforts were significantly bolstered when citizens of the city of Middlesboro, Kentucky, including the local Coca-Cola bottling company, and the National Parks and Conservation Association petitioned the Department to deem lands adjacent to the park unsuitable for coal mining. This activity in the area would have marred an idyllic scenic overlook in the park, contaminated park water resources and the local drinking water supply, and impacted an endangered species in the area.

National Park Service staff worked closely with staff from the Office of Surface Mining during the deliberative process and articulated the park's resource management concerns and its economic contribution to the local economy. We also elevated these concerns to DOI decision makers. The efforts paid off. For now, the park is protected from coal mining along its Tennessee boundary.

However, Cumberland Gap also lies in Kentucky and Virginia, and the State of Kentucky is currently entertaining a proposal to mine coal in the vicinity of the area judged unsuitable for coal mining on the Tennessee side. While the local community filed to have lands in Kentucky (who is the decision maker in this state, not the federal government as in Tennessee) similarly declared unsuitable, the state rejected the petition based on what it characterized as the temporary nature of the anticipated impacts.

Nonetheless, under both the Surface Mining Control and Reclamation Act and Kentucky law, the state must obtain the approval of the Park Service before it can permit a coal mine that will adversely impact the park. Having authority to approve or disapprove the pending permit gives the National Park Service a pivotal role that it will exercise in keeping with its strong protection mandates.

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This scenic vista of Fern Lake in Cumberland Gap National Historical Park was recently protected from potential coal mining disturbance.



Cumberland Gap National Historical Park



NEW HORIZONS

In 1996, the National Park Service developed innovative approaches to preserve the natural resources of the national park system. Driven by the need to progress in light of rising threats and declining expenditures for natural resource management, managers across the country developed new and better ways of protecting natural resources with the staff and funds that they have. Working smarter, this technical yet passionate work force created opportunities where few initially seemed to exist and made some exciting improvements that advanced our efforts to meet mounting challenges.

Innovative staffing **New program prescribed for wildfire management**

by Ben Jacobs

Fuel accumulation has reached dangerous levels throughout most western U.S. forests. All one has to do is look at the onslaught of wildland fires that affected national parks in the summer of 1996 to realize that resource managers no longer have the luxury of responding solely in the tradition of full fire suppression. To do so ultimately contributes further to increased fuel loads. The Ackerson Complex in Yosemite, the Chapin Fire in Mesa Verde, and the Dome Fire in Bandelier all bear testimony to nature's furious reply to decades of fire exclusion.

Using a proactive approach to the hazard fuel problem, the National Park Service created the Prescribed Fire Support Module Program in 1995. What started out as a trial experiment evolved into a full-fledged undertaking during the 1996 fire season. The program consists of 28 individuals divided into five modules and distributed between Bandelier National Monument, Whiskeytown National Recreation Area, and Yellowstone and Zion national parks. According to the program operations guide, "the purpose of the modules is to provide the National Park Service with skilled and mobile personnel that are dedicated

principally to prescribed fire management." In 1996, this was the only program of its kind in the nation.

The primary mission of the module is to assist with prescribed natural fires in the areas of holding, monitoring, and mapping and predicting fire behavior. Prescribed natural fires are naturally ignited wildland fires that are allowed to burn as long as they are within specific weather and fuel prescriptions; experts are needed on site to monitor their behavior and keep them within designated boundaries. Module members were a key resource on 14 prescribed natural fires in the national park system in 1996. From Sequoia-Kings Canyon to the Everglades, module personnel rotated through prescribed natural fires in six national parks. While some of the fires never grew larger than 1 acre, five of them reached acreages greater than 1,000. Large landscape fires of this size are exactly what many parks need to reduce fuels to manageable levels.

Another tool the modules use to achieve this end is to ignite, hold, monitor, and prepare management-ignited prescribed fires. This is the second priority of the program, and in 1996, modules assisted 16 parks with over 40 of these burns.

Despite these successes, more is needed to restore fire to its proper ecological role in the national park system. During busy times, such as the autumn burning season, demand for the modules far exceeds the supply. By some estimates, six to seven modules are needed year-round to manage just the management-ignited prescribed

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**A researcher prepares to look for
lofty lichens at Sequoia National Park.**

fires throughout the park system. Other federal agencies have become increasingly interested in using modules for holding prescribed natural fires and executing management-ignited prescribed fires, or as models for similar programs to reduce their own hazard fuels.

As we head into the 1997 fire season, the Prescribed Fire Support Module Program will possibly expand into the Midwest Region. To mitigate budget constraints, future modules may be partially funded by other federal agencies. Dedicated prescribed fire resources are an important step toward our commitment to reduce fuels in national parks. With the establishment of this program, we continue to be at the forefront of progressive fire management.



Fire Management Program Center

The Prescribed Fire Support Module monitored, controlled, and mapped several blazes in the national park system in 1996, including the Wildcat prescribed natural fire at Zion National Park, Utah.

New methods Katmai takes on a dirty job and does it right

by Mark Ziegenbein

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Park visitors demand smooth roads, well-maintained campgrounds, and safe facilities. Few, however, consider the millions of tons of sand, rock, and gravel needed to build and maintain the conveniences we all take for granted. Fewer, yet, think of the large areas of land that we disturb to get these raw materials. In 1996, the NPS Geologic Resources Division and Denver Service Center developed a blueprint for Katmai National Park and Preserve, Alaska, to achieve

its maintenance goals while reducing overall impacts to its natural resources. The *Katmai Sand, Rock, and Gravel Plan* may serve as a template for other parks with similar maintenance concerns.

At last count, the National Park Service was responsible for maintaining at least 16,000 buildings, 8,000 miles of roads, 1,450 bridges and tunnels, 400 dams, 5,000 housing units, 1,500 water and sewer systems, 300 fueling facilities, and 2,000 fuel storage tanks. All these require sand, rock, clay, or gravel to build and maintain. Resurfacing a typical two-lane road can take 12,000 cubic yards of aggregate per mile (equivalent to 3.2 Washington Monuments), even when the pavement is recycled. Consider the miles of roads in parks and that

An active gravel source, this pit at Katmai will be reclaimed as addressed in the recent sand and gravel management plan.

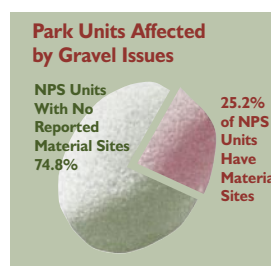


Geologic Resources Division

each mile will be resurfaced every 15 years and the staggering consumption rate becomes evident. While most parks get gravel outside their boundaries, others may need to extract internally due to material availability, the park's remoteness, or the economic and environmental impacts of gravel importation. Nationwide, over 1,000 extraction sites exist in more than 80 units of the national park system, and parks are currently mining 165 of these sites for maintenance or construction projects.

Katmai has just completed a sand, rock, and gravel plan. This plan serves as an example of how thoughtful planning can reduce costs, restore old extraction areas, and minimize the impact of future mining. The integrated project planning and environmental review process at

Katmai involved quantifying current and long-term gravel needs; identifying potential gravel sources within and outside the park; investigating potential resource conflicts with the help of park experts and the public; documenting the dollar and environmental cost of importing material versus in-park extraction; and, once it was clear that in-park extraction was the only reasonable option, designing an extraction and restoration plan that reduced the overall area of disturbance, closed unneeded pits, and concentrated activities in areas that avoided adverse impacts. As demonstrated at Katmai in 1996, with careful design, documentation of environmental effects, and the involvement of resource experts and the public, parks can provide for sand, rock, and gravel needs without excessive impacts.



Number of park units affected by gravel issues. Figures are derived from a 1992 administrative sand and gravel questionnaire.

Collaborative decision making in the Pacific Northwest

by Cathy Rhodes

The Clean Air Act provides a regulatory process called Best Available Retrofit Technology (BART) for protecting visibility in Class I areas, which include many units of the national park system. This process is complex and requires economic analysis and scientific studies to determine if control technology should be applied to a pollution source that is contributing to visibility impairment. In 1996, the potential for diminished views at Mount Rainier National Park, Washington, led to an alternative process for protecting natural resources that resulted in a quicker and better solution.

Located 50 miles south of Mount Rainier, the Centralia Power Plant is coal-fired and does not currently control sulfur dioxide emissions. National Park Service research from 1990 indicates that the plant contributes significantly to visibility impairment at the park, making it a candidate for BART. In 1995, a state permit action that could have precluded future control requirements under BART forced the National Park Service to take action.

To avoid the staff and research-intensive requirements of the BART process, the National Park Service,

plant owners, the U.S. Forest Service, and regulatory agencies formed a collaborative decision making group. Intense monthly meetings in 1996 required participants to understand and evaluate complex technical processes and economic information, changing regulations, and each other's concerns. The resulting solution reduces the frequency of the plant's impact on visibility at the nearby Class I areas from 26% of "clear" days to 1% of clear days in eight years. BART could have taken much longer due to "dueling research" and litigation of results.

Also, because of the factors considered, BART would likely have resulted in less emissions reductions than the collaborative solution, which meets the goal of achieving greater benefit for park resources without adversely affecting the economy of the local community.

In 1984, we identified visibility impairment in all of our Class I areas in the lower 48 United States. However, sufficient staff and money are not available to identify and pursue all contributing sources. Likewise, data are lacking to satisfy critics and sustain legal processes. Nevertheless, should the opportunity arise in the future, the collaborative decision making process serves as a model for how we can work with interested parties to resolve our concerns in a more cooperative, expeditious, and certain manner than provided by legal alternatives.

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Future emissions from the Centralia Power Plant will be reduced according to a solution reached by a collaborative decision-making group, improving visibility at Mount Rainier National Park.

Resources benefit from new evaluation process

by Abigail Miller

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A new look for the National Park Service line-item construction program suggests that resource managers should pay more attention to construction projects as potential natural resource management solutions. This program was reengineered in 1995 and 1996, partly in response to congressional expressions of concern that included cost overruns and a finding that “the priority system [used by the National Park Service] is undecipherable.”

In the past, the National Park Service relied on the collective wisdom of its senior managers in an informal process to set construction priorities. In 1996, we adopted a new system that uses a formal process and a project assessment team to rate and rank projects. Called *choosing by advantages*, the decision-making process focuses on the importance of individual contributions, or specific advantages, of each project, rather than the importance of broad, abstract categories.

Last July, the results of reengineering the priority-setting process were implemented for the first time and numerous projects with benefits to natural resources were evaluated. Most of these were projects to reduce or eliminate water pollution, and sewage treatment projects were the most common. Upgrades of such plants at Yellowstone and Glacier Bay national parks that

would eliminate discharges to sensitive waters, and had good information about the discharges and the threats they pose, scored relatively high in the “eliminates threats” category. Projects to remove septic systems that were leaking near wetlands or significant water resources at Cape Cod National Seashore and Acadia National Park also scored well. Two high-scoring projects at Mammoth Cave and Wind Cave national parks dealt with preventing polluted waters from entering cave systems. Many additional projects that would benefit natural resource preservation in other ways also scored well.

We learned some lessons here. First, if construction can provide solutions to natural resource problems, resource personnel should work closely with their facility manager as they design projects. Second, the definition of what constitutes a “construction” project is broader than many believe. If a project costs more than \$500,000 and less than \$20 million, it may be eligible for construction funding and it could be a resource rehabilitation project. Third, projects that have resource benefits of any kind will receive more credit if objective data are included in the package. Fourth, the system is explicitly open to resource protection projects and will give them a fair evaluation. Finally, the new process adds value to parks by favoring those projects that contribute to resource protection, high quality visitor experience, or improved park operations, including operating in a sustainable and environmentally responsible manner.



Open to the elements and subject to vandalism, this fossilized sequoia tree stump at Florissant Fossil Beds National Monument, Colorado, will be protected in the future through construction of a shelter structure.



Cabins at Sequoia National Park are slated for removal under the new construction project evaluation process. Estimated to cost \$100 million, projects of this magnitude will require specific direction from Congress in the future.

Technical advances Canada thistle control by insects

by Ross Rice and Dan Roddy

In 1996, biological control of the Canada thistle made the leap from research to applied resource management at Wind Cave National Park, South Dakota. A problem in western U.S. parks for years, Canada thistle is a fast-spreading exotic that overtakes native vegetation, greatly altering the natural landscape. Although herbicides offer a course of control, they have substantial disadvantages associated with them. They are not specific and kill both target and nontarget species. This can create a disturbance zone that is ripe for invasion by aggressive exotics, making restoration of a natural condition nearly impossible. The thistle can also become resistant to some herbicides over time.



Canada thistle (*Cirsium arvense*), a widespread noxious weed in many North American parks.

Furthermore, some of the herbicides most effective against the thistle are carried in groundwater and runoff, a particular concern for cave resources. We banned the use of herbicides around the cave and forced ourselves to find other alternatives. The answer was biological controls.

The project began in 1991 under the direction of Dr. Deborah M. Kendall, an entomologist from Fort Lewis College, Durango, Colorado. Her work has focused on using three biological control agents: a gall fly (*Urophora cardui*), a stem mining weevil (*Ceutorhynchus litura*), and a seed head weevil (*Larinus planus*). All have been approved by APHIS, the Animal and Plant Health Inspection Service, and others for release in the United States. Researchers and resource managers have monitored study plots annually since the first experimental releases in 1991. Results have varied, but reductions of the thistle by as much as 48% have been recorded in a single year. Biological controls do not eliminate nontarget species, and native grasses and forbs are clearly returning where the thistle has been reduced.

In 1996, the park began harvesting biological control insects from research plots for deployment in new sites throughout the park. Seven-hundred seed head weevils and 30 galls were collected from six sites and released in eight previously untreated sites. Collection is a simple matter of removing insects from established sites and releasing them at new sites. Park staff trained a Student Conservation Association crew in about an hour, and before the day was over the crew completed the entire process of collection, transportation, and release.



The biological controls in use at Wind Cave include the release of the gall fly (*Urophora cardui*).

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The flowerhead weevil (*Larinus planus*) is also a biological weapon against the Canada thistle.

While collection and release is simple, startup costs for the control agents themselves are high. In comparison with the annual cost of herbicides, however, this program may be more affordable in the long run. Training and certification for the use of herbicides is costly, and the herbicides themselves are expensive. Biocontrol requires little application training, no certification, and no hazardous materials

disposal fees. Costs may also drop if the program becomes self-perpetuating and a supply of insects is readily available for collection and release on other park sites.

Like the thistle, the biocontrol program is spreading. In 1996, Badlands National Park started a similar effort in association with Dr. Kendall modeled after the Wind Cave program.

Improving communications **Building public support for natural resource management**

by Lissa Fox

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Natural resource preservation and protection is a complicated and complex process. This complexity often breeds public confusion just when the parks need public support. An informed public, one that understands the critical resource issues facing the parks, can and should be our greatest ally for resource protection.

To advance public understanding of natural resource issues, an interdisciplinary group of resource managers

and interpreters produced the *Natural Resource Issues Interpretation in the National Park Service: Action Plan* in 1996. Derived from recommendations made in response to *A Strategic Plan for Improving the Natural Resource Program of the National Park Service*, the plan lays out a clear strategy for educating the public on natural resource issues using the established and accomplished interpretive infrastructure of the National Park Service.

Each recommended action has been assigned a time frame and the responsible individuals identified. These individuals range from the NPS director to field resource managers and interpreters. No one individual is responsible for implementation of the plan; in order for it to succeed, everyone in the National Park Service must accept responsibility.

Ranger-guided activities
that incorporate discussions of science
and resource management issues are
critical to the mission of natural
resource preservation in parks.



Taking advantage of the Information Superhighway

by Jen Coffey and Chuck Rafkind

The National Park Service undertook a major redesign of its World Wide Web site and servers in 1996, affirming its commitment to use of the Information Superhighway as a valuable medium for exchanging information with partners and helping the public understand the need for preserving the resources in the national park system. Although we have made progress toward the goal of connecting all parks to DOI-NET and the Internet, limited funding has hampered this effort leaving about 150 parks still to be connected. Those parks with access to the Web are finding that this technology opens up a new world of cooperation, information resources, and ease of communication.

Through the Internet, we can access a wealth of information applicable to many different areas of responsibility. We can learn of training and conference opportunities and about issues that concern other governmental and nongovernmental organizations and what they are doing about them. This communication tool broadens our base of knowledge, understanding, and support, and is like adding a staff of hundreds of specialists and interested parties. It gives us a broader audience and can increase participation in park programs—expanding a park's network of partners. It also speeds up information transfer and can be a time and money saver. Furthermore, it has become a new forum of public outreach as parks distribute reports and other park literature to interested individuals, and governmental personnel on the local, state, regional, and federal levels quickly.

For example, during 1996, the resource management staff at Colonial National Historical Park in Virginia was able to develop and recruit new researchers for the park natural science program through the Internet. They used this tool to discuss and develop water-quality monitoring protocols for specific projects. Within two weeks, the park shared four drafts

among university and NPS scientists and have a final agreed upon protocol and cooperative agreement.

The Park Service is using the Internet as a conduit to furnish information at both the park and national levels. Each park has a web page and the new NPS natural resource website, named NatureNet, was introduced in 1996. NatureNet provides information on the air, biologic, geologic, and water resources in the national park system. It incorporates an electronic publishing program, new in 1996, with electronic copies of more recent natural resource publications now available on the Internet. An e-mail button located on NatureNet allows the public to readily communicate with us instantaneously from anywhere in the world regarding their questions, concerns, and suggestions about the care of the resources in America's national parks. Visitation to NatureNet increased at a rate of roughly 10% each week throughout 1996, with about 22,000 visits per week by the year's end. Indications are that this trend will continue.

Although the National Park Service made strides during 1996 in using the Internet, additional technologies are needed to optimize the use of the Information Superhighway in helping us accomplish our mission. For example, an *intranet* for our internal use is being developed to facilitate the exchange of information between parks and central offices. The conversion of natural resource database application software is being considered so that natural resource information from parks may be easily and securely accessed, updated, and processed through the intranet. Perhaps the most important task ahead is to get all parks connected to the World Wide Web to enable them to partake in the opportunities it provides.

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The Information Superhighway has the potential to connect parks with science agencies, libraries, museums, and other sources of information.



Natural Resource Information Division, Philip Thyts



PEOPLE & PRESERVATION

In 1996, employees of the National Park Service and our cooperators in research and resource management continued to make a difference in meeting complex challenges head on and protecting park resources. As the following stories indicate, natural resource preservation in the national parks brings out the best in individuals who are excited by their work and strive for high ideals. In the end, we are an organization of people whose dedication, expertise, and ability to focus on the resource preservation tasks at hand ultimately spell natural resource protection in parks. This human resource is every bit as precious as the natural resources in our care.

Persistence Kemp's Ridley returns to Padre Island

by Lissa Fox

In the 1940s, 40,000 Kemp's ridley sea turtles nested annually on a beach near Rancho Nuevo, Mexico. By the 1970s, the number of nesting turtles had dropped to 400. In only 30 years, the Kemp's ridley had become the most endangered sea turtle in the world.

In a desperate attempt to save them from extinction, an international, multiagency recovery effort was launched in 1978. In addition to protecting the Rancho Nuevo nests from the human predation that had decimated the populations, the recovery project decided to try a new and untested management strategy—create a new nesting site for the turtles in a protected area. From 1978–88, 22,507 eggs were collected in Rancho Nuevo, then incubated and released at Padre Island National Seashore, Texas, in an attempt to imprint the hatchlings on the park so that they would return there to nest. This unprecedented experiment, if successful, would not only help to ensure the continuation of the severely endangered species, but could also change the way sea turtles are managed throughout the world.

Each year, researchers and volunteers combed the beaches of the seashore, searching for nests. In 17 years of monitoring (1978–95), only seven nests were

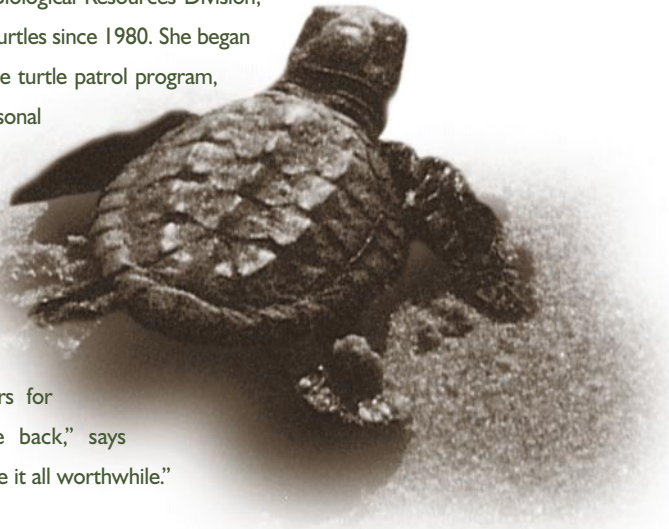
found—promising, but not as many as researchers had hoped. Finally, in the summer of 1996, the turtle recovery effort paid off big. That year, Donna Shaver, the director of the Padre Island sea turtle recovery effort, confirmed six Kemp's ridley nests on the Island! Even more exciting, two of the turtles wore tags, identifying them as part of the original releases from Padre Island. These two turtles seem to have imprinted on the seashore. If they and others continue to return to the park, as researchers now expect, the face of turtle recovery efforts will change forever. Protected areas throughout the world could serve as nesting sites for endangered turtles, significantly increasing their chances for survival.

Shaver, formerly with the National Park Service and now with the USGS Biological Resources Division, has worked with the turtles since 1980. She began as a volunteer with the turtle patrol program, then worked as a seasonal employee for five years, and finally became director of the program after receiving her graduate degree. "I've been waiting 17 years for the turtles to come back," says Shaver. "This has made it all worthwhile."

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Turtle recovery director Donna Shaver (left) watches with satisfaction as hatchling Kemp's Ridley sea turtles head out to the gulf at Padre Island National Seashore, Texas.

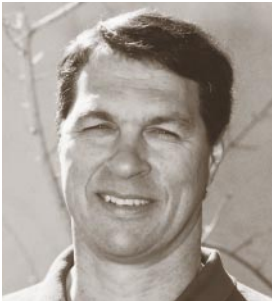
Kemp's Ridley turtle (below)



Conviction Resource specialist receives Mather award

by Jeff Selleck

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Riley Hoggard

We are not putting park natural resources on a high enough pedestal these days," according to Riley Hoggard, Resource Management Specialist at Gulf Islands National Seashore. Hoggard is the 1996 winner of the National Parks and Conservation Association-Stephen Tyng Mather Award. He received a \$2,500 cash prize from the conservation organization last November for his efforts in fighting for the relocation of an important road in the park. His strong conviction for doing what is right is likely to make a difference to nesting sea turtles and other wildlife, allowing the processes that both build and erode sand dunes to continue unimpeded.

The problem began when Hurricane Opal destroyed a 7-mile section of Highway 399 in the Florida district of the Florida and Mississippi park in October 1995. "The road was clearly in the wrong place," Hoggard explained. "It had prevented the natural migration of sand dunes. If rebuilt in the same place, it would result in an artificially steep beach that could impact nesting sea turtles and other wildlife."

Hoggard saw this act of nature as an opportunity to move the road to a more sensible location. Bolstering

his position was the park general management plan, which recognizes that roads and campgrounds are not considered permanent structures when washed out. However, pressures from local communities, economically hard hit by the storm, initially convinced park officials to agree to rebuild the road promptly in its original location. Disillusioned, Hoggard began a lonely vigil of arguing for road relocation that lasted 10 months.

To make his point, the talkative 20-year veteran of the National Park Service toured cooperators on-site to demonstrate the problems associated with the road placement. Time after time experts from the Army Corps of Engineers, U.S. Fish and Wildlife Service, and Florida Department of Environmental Protection agreed that sand dunes would reform naturally if the road were moved. Their corroboration and scientific data showed that relocation was the right course of action and would also minimize the likelihood of similar future road damage. In the end, the Federal Highway Administration funded 3 miles of road relocation because it made both ecological and economic sense. "The right time to move a road is right after a large storm like this," Hoggard continued. "Habitat is already disturbed. Additional disturbances caused by road construction are inconsequential."

Hoggard kept the issue alive until early opponents were converts. From the experience, he explained, "If we don't stand up in our local communities and say no when we have to, we will lose parks as we know them."

Ingenuity Partnership honored by National Park Foundation

by Jeff Selleck

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Bats and visitors in Big Bend National Park, Texas, are better off following the 1995 installation of habitat-preserving batgates over dangerous mine openings at the abandoned Mariscal mercury mine. The new closures allow free passage of bats, are much more effective at excluding humans, and are more in keeping with the historic fabric of the site. In April 1996, the National Park Foundation, the Congressionally chartered nonprofit fundraising partner of the National Park

Service, recognized the partnership between the National Park Service and the Railroad Commission of Texas that led to the completion of the innovative project. Presented by NPS Director Kennedy in the Rayburn House Office Building, the award went to Linda Dansby (NPS Southwest Support Office), John Burghardt (NPS Geologic Resources Division), Mike Fleming (Big Bend National Park, now retired), and Mark Rhodes (Railroad Commission of Texas) for their roles in restoring bat habitat, protecting wildlife and cultural resources from human disturbance, and improving public safety.

Dansby, who is the NPS Intermountain Region Minerals, Oil and Gas, and Geologic Resources Program Leader, was the principal coordinator for the Mariscal

project. She coordinated resource and engineering surveys and wrote the environmental assessment (EA). Fleming, then Environmental Protection Specialist at Big Bend, circulated the EA for public comment, completed the NEPA process by writing a *finding of no significant impact-decision record*, and coordinated contractor operations at the site. Burghardt, a geologist with expertise in abandoned mine closures and bat conservation issues, assisted park staff in inventorying the mine openings and identifying hazards. He also provided technical oversight with Fleming during the implementation of the contract. The \$177,000 batgate construction and installation contract was funded by the Railroad Commission of Texas, Division of Surface Mining and Reclamation, through a cooperative agreement arranged by Geologic Resources Division staff. Rhodes, who is Assistant Division Director of the Abandoned Lands Section of the Texas Surface Mining and Reclamation Division, obtained state funding

from Title IV provisions under the Surface Mining Control and Reclamation Act.

According to Dan Taylor, North American Bats and Mines Project Director for Bat Conservation International, “the Mariscal Mine closure project is one of the most extensive, innovative, and ecologically important mine closures ever undertaken in North America.” The project was completed in a timely fashion and within budget, largely due to excellent coordination by the four honorees. Reflecting on the award, Dansby said that “Mariscal Mine is a wonderful success. With over 10,000 abandoned mine hazards in the national park system, we have many opportunities for similar partnership projects.” She also observed that the “National Park Service has experienced great support from states in closing mine openings.” This is certainly true in Texas where the Mariscal effort spawned a similar project in 1996 in Guadalupe Mountains National Park, also funded by the Railroad Commission of Texas.



Mark Rhodes and Big Bend Superintendent José Cisneros

Leadership Retiring superintendent knows the value of resource management

by Steve Petersburg

Denny Huffman is a leader with natural resource preservation on his mind. In nine years as Superintendent of Dinosaur National Monument, Colorado and Utah, the 34-year veteran of the National Park Service has provided guidance in such critical efforts as endangered species recovery, rare plant inventory and management, integrated weed management, prescribed natural fire programs, riparian restoration projects, protection of river corridor ecosystems, and operation of the Flaming Gorge Dam.

Huffman has also addressed resource problems resulting from legally prescribed livestock grazing within the monument. “We competed for Natural Resource Preservation Program funds that allowed us to use range professionals from academia to do scientific range surveys,” Huffman commented. “Results are not complete, but the studies have found that some park areas are heavily impacted, particularly near water.” Huffman’s

efforts to bring grazing into some sort of resource-oriented compliance have resulted in a lawsuit against the National Park Service.

According to Huffman, timing is as important as science in resolving tough resource management issues. While Superintendent at Colorado National Monument from 1980-87, he succeeded in removing a beloved herd of nonnative bison that had been residing in the park since around 1925. “The animals were very popular, and we could not rush into a decision to remove them,” Huffman explained. “We gradually held town and park neighborhood meetings where we presented research findings that indicated the poor health of the vegetation. Eventually, public opinion swayed and we removed the bison, but we had to be patient.”

Another key to his success has been his skill in forging alliances with park neighbors, local and state governments, other federal agencies, and private conservation organizations. “We tend to focus rather narrowly on our own disciplines and mission in the National Park Service,” says Huffman. “We also need to understand our neighbors and the social, political, and economic factors surrounding park protection issues. We can still be very influential and come from a position of respect.” At Dinosaur,

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Denny Huffman

these associations have improved local community and interagency support, led to resource sharing, and funded many resource management, research, and visitor services activities through outside sources.

Planning to retire in early 1997, Huffman has always taken a strong and proactive public stand for the protection and restoration of park resources and their values. He explains, "our efforts in maintaining good outside relationships should never eclipse our responsibili-

ties for resource protection. Resource protection must always be our top priority." While some individuals in other agencies and local communities may have disagreed with him, they have never been able to claim they were unaware of the positions and policies of the National Park Service. His efforts have led to increased awareness, better protection, and improved management of natural and cultural resources in many units of the national park system.

Special skills **Air quality at Big Bend is an international challenge**

by Miguel Flores

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Miguel Flores (right) demonstrates how to change a particle filter at an air sampling site east of San Antonio, Texas.

Since 1993, staff from the NPS Air Resources Division and Big Bend National Park, Texas, have been involved in a binational effort with Mexico to improve air quality at the park. At issue is the extent to which air pollution emissions from regional sources, including those from two coal-fired power plants located 12 miles south of the U.S.-Mexico border near Piedras Negras, Coahuila, contribute to visibility degradation in the Big Bend region. Long-time residents of and visitors to the area report worsening vistas, particularly in recent years. Previous NPS studies have implicated emissions from Mexico as being the primary contributor to visibility degradation at the park, especially during summer.

The Clean Air Act mandates visibility protection in Class I areas such as Big Bend. Mexican statutes, however, have no similar provisions. Although the two power plants comply with Mexican environmental laws, they have no pollution control devices for sulfur dioxide. As a result, they emit between 160,000 and 240,000 tons of the pollutant annually. This is of great concern to the National Park Service because these emissions convert into sulfates in the atmosphere, fine particles that cause 40%–50% of the visibility degradation observed at the park.

Big Bend lies approximately 130 miles northwest of the power plants and is directly downwind of the emissions during summer. Air quality modeling studies

performed by the Air Resources Division confirm that emissions from these power plants reach the park and contribute significantly to regional haze. Although the National Park Service considers these emissions responsible for causing significant visibility degradation, the actual contribution they make to the overall visibility impairment at the park is the subject of debate between the two governments.

A binational technical work group, including NPS representation, has investigated the issue since November 1993, and in March 1996 jointly recommended that a regional approach be taken to resolve the problem. Insufficient data exist now to determine whether control of the power plant emissions would solve the Big Bend visibility problem. Accordingly, we have worked with the EPA and the Mexico Procuraduría Federal de Protección al Ambiente to design regional air quality monitoring studies that identify the specific emission source regions and types primarily responsible for the air quality problem at the park. In summer 1996, a preliminary study was conducted involving 19 sampling locations in northern Mexico and southwest Texas. The findings will be used to design more intensive studies to be conducted in winter and summer 1998.

Representing the Park Service on the binational work group is Miguel Flores of the Air Resources Division. Also involved in the issue is José Cisneros, Superintendent of Big Bend National Park. Both are natives of south Texas and have found their work on this issue to be incredibly rewarding and challenging. Their bilingual skills and knowledge and understanding of the Mexican people, their culture, and their political and economic systems, have proven to be invaluable assets during bilateral negotiations.

Last summer's air sampling study, funded by EPA, marked the first time that both countries joined to investigate transboundary air pollution as it relates to visibility impairment in protected areas on both sides of the border.

We hope to continue working cooperatively to investigate appropriate bilateral emission control strategies that will improve air quality in Big Bend and recapture some of the scenic vistas for which the area has been known.

Diversity Director honors natural resource stewards

by Jeff Selleck

"Hawaii may be providing the national park system with a taste of things to come," according to Superintendent Bryan Harry of the Pacific Islands Support Office. Harry was referring to the challenge of dealing with fire-adapted nonnative grasses in the Pacific islands parks. "While island ecosystems are the first to feel the severity of effects of nonnative species, the mainland will face the same challenges in the future." Last August, he and two colleagues received the 1996 Director's Awards for Natural Resource Management. Given annually to a superintendent, resource manager, and researcher, the prestigious honor underscores the importance of technical expertise, continuity, and innovative thinking in research and natural resource management.

Harry was recognized for his influence in conserving vestiges of native Pacific ecosystems over the last 25 years. He and his staff changed the mind set in Hawaiian parks from accepting "inevitable" resource deterioration to proactive management that reverses deterioration. "We also shifted our concept of measuring success from how many alien animals we killed to basing removal decisions on the overall impacts the nonnative species have on the native populations."

Also winning an award was Terry Hofstra, Chief of Resource Management at Redwood National and State Park, California. Despite the threat of nearby logging to the Marbled Murrelet, an endangered bird that nests in old-growth redwoods, Hofstra saw the potential for long-term benefit. By preparing a second-growth forest management plan before logging could ensue, the parks positioned themselves to accept funds, mandated by the Endangered Species Act, from the logging company to counter habitat

disruption. If its logging request is approved, the company would fund thinning of 10 acres of second-growth forest on park land for every acre of old-growth disturbed on private land. Thinning speeds recovery to old-growth, increasing future habitat for murrelets. Hofstra sees this as "a timely and much needed example of the flexibility of the act in providing for endangered species preservation while accommodating some commercial activities." Hofstra is also a leading proponent of inter- and intra-agency and private sector cooperation. During his tenure, he has helped the parks advance toward ecosystem management and address a broader range of natural resource issues. In that time, his staff has progressed considerably in mitigating erosion from logging roads.

Paul Buckley was honored for the application of his research to park resource management over the past 25 years. His work has typically explored the interplay between resource recreation uses and their impacts on the population and health of plants and animals. A Senior Scientist in ecology with the USGS Cooperative Park Studies Unit at the University of Rhode Island, Buckley is an expert in population biology of shorebirds and the biodiversity of birds in northeastern national parks. Working as shorebird ecologist in the late 1970s, he assisted the National Park Service in gaining colonial water bird and Piping Plover habitat protection in the face of numerous beach nourishment projects along Fire Island National Seashore in New York. Thanks in large measure to NPS management in coastal parks and seashores, the plover is now making a comeback.

Winning the award was extremely satisfying to Buckley because, as he put it, "my colleagues and I have been very persistent over the years pursuing critically needed park research projects. There is tremendous need for much more site-specific inventory and general ecosystem research in our parks. Such research is essential to the long-term management of the natural resources under our care."

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Bryan Harry



Terry Hofstra



Paul Buckley



LOOKING AHEAD

Looking to the future

by Denis Galvin

The challenges for the future of natural resource management in the national park system are discernible in the stories of the past year. Such problems are not new. In 1953, after war and postwar priorities had cut park funding as visitation climbed, an article in *Harper's Magazine* warned that the national park system was verging on crisis and that "much of the priceless heritage . . . is beginning to go to hell." Parks have long felt this concern. However, the scope of the problems facing natural resource management has compounded over time.

The solutions involve efforts in many disciplines. *Science*: The National Park Service must acquire more knowledge about park resources through inventory, monitoring, and research. Park science must encompass economics, social science, and the biological and physical sciences, and must stress professional credibility, peer review, and publication. Although scientific information is increasingly essential to prudent management, it is rarely sufficient to achieve natural resource protection. *Law, Policy, and Politics*: Park Service personnel must also know the legal responsibilities and opportunities for natural resource protection, the associated policies, and the politics that affect the range of possibilities. With this knowledge, professional natural resource managers can gather the highest priority scientific information and employ it in the most effective forums. *Education and Outreach*: Resource protection ultimately depends on an informed and supportive public. Scientists must analyze and interpret data and publish results. Resource managers must make the scientific knowledge accessible to park managers, interpreters, other government agencies, and the public. Skilled resource managers must integrate the science, law, and policy into communication that stimulates thought and affects attitudes.

For many reasons, not the least of which are funding and personnel constraints, the future requires continued creativity in solving problems. The NPS proposal for cooperative ecosystem studies units (CESUs) holds promise for efficiently increasing scientific support for management. It also expands the scope of the science to whole systems and landscapes, a critical step for effective ecosystem management.

Ecosystem management requires use of a full array of disciplines, information, and partnerships, and its success depends on developing a shared vision among key decision makers and elements of the public. It can be difficult and often frustrating, because it demands new levels of cooperation among interests often unaccustomed to working together. However, it is essential to long-term park protection. By integrating and reconciling potentially conflicting environmental and economic needs, ecosystem management strives to achieve park protection and to provide for long-term sustainable economic productivity throughout an ecosystem.

A tremendous asset of the National Park Service for achieving success in resource protection is the ardor and dedication of natural resource personnel, some of whom are highlighted in this report. The participants in the Fundamentals for Natural Resource Management training course captured the indomitable spirit of this work force in their declaration of commitment, dated June 27, 1996:

"The preservation of resources for the enjoyment of future generations is embedded in our hearts. The values and principles for which the National Park Service was established inspire us to fulfill our commitment to this vision."

The future of natural resource management in the National Park Service is in good hands.

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